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July 9, 2010

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ATTN: CENWK-PM-ES/Buckrucker  
CONTRACT: W912DQ-08-D-0018  
PROJECT: Lower Passaic River Restoration Project  
Remedial Investigation/Feasibility Study Oversight  
Lower Passaic River Study Area, New Jersey  
SUBJECT: Quality Assurance Project Plan, Final Addendum #4  
Surface Sediment Samples Co-located with Small Forage Fish Tissue  
Samples - Collected in conjunction with the Summer 2010 Benthic  
Community Survey

Dear Ms. Buckrucker:

CDM Federal Programs Corporation (CDM) is pleased to submit this electronic copy of the Quality Assurance Project Plan, Final Addendum #4, Surface Sediment Samples Co-located with Small Forage Fish Tissue Samples collected in conjunction with the Summer 2010 Benthic Community Survey for the Oversight of the Remedial Investigation/Feasibility Study in support of the Lower Passaic River Restoration Project in the Lower Passaic River Study Area, New Jersey. This document is based on the CPG's Benthic QAPP Addendum Number 2 and has been updated to reflect comments received from EPA.

If you have any comments concerning this submittal, please contact me at (212) 377-4056.

Very truly yours,  
CDM FEDERAL PROGRAMS CORPORATION

A handwritten signature in black ink, appearing to read 'C. Tsang'.

Frank Tsang, P.E.  
Task Order Manager

Attachment

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J. Mosher, P.E., CDM (Letter Only)  
G. Molnar, CDM  
Project File

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US Army Corps of Engineers  
Kansas City District

Quality Assurance Project Plan  
Final Addendum #4  
Collection of Surface Sediment Samples co-located  
with Small Forage Fish Tissue Samples during the  
Summer 2010 Benthic Invertebrate Community  
Survey

Remedial Investigation/Feasibility Study Oversight  
Lower Passaic River Restoration Project  
Lower Passaic River Study Area, New Jersey

USACE Contract No. W912DQ-08-D-0018  
Task Order No. 014

July 9, 2010

**LOWER PASSAIC RIVER RESTORATION PROJECT  
OPERABLE UNIT (OU) 2**

**Remedial Investigation/Feasibility Study Oversight  
Quality Assurance Project Plan  
Final Addendum #4  
Collection of Surface Sediment Samples  
Co-located with the Small Forage Fish Tissue Samples  
During Summer 2010 Benthic Invertebrate Community Survey  
Lower Passaic River Study Area, New Jersey**

**USACE CONTRACT No. W912DQ-08-D-0018**

**TASK ORDER No. 014**

**July 9, 2010**

**Prepared for:  
U.S. Army Corps of Engineers  
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CDM Field Oversight Form in Appendix B of the Physical Water Column Monitoring/Generic Final QAPP dated March 9, 2010 will be used during the Surface Sediment Sampling.

**Note:** Worksheets not included herein are included in the Physical Water Column Monitoring/Generic Final QAPP dated March 9, 2010.

## Acronyms

%	percent
%D	percent difference
%R	percent recovery
µg/g	microgram per gram
µg/L	microgram per liter
A	analytical
AAS	atomic absorption spectrometry
ABS	absolute difference
AES	atomic emission spectrophotometry
ANSETS	Analytical Services Tracking System
ASC	analytical services coordinator
ASTM	American Society of Testing and Materials
BS	Bachelor of Science
CA	corrective action
CAS	Chemical Abstract Service
CCV	continuing calibration verification
CD	compact disk
CDM	Camp, Dresser & McKee
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHMM	Certified Hazardous Materials Manager
CIH	certified industrial hygienist
CLP	Contract Laboratory Program
COC	chain of custody
CPG	Cooperating Parties Group
CRM	certified reference material
CRQL	contract required quantitation limits
CVAFS	cold vapor atomic fluorescence spectrometry
DESA	Division of Environmental Science and Assessment
DL	detection limit
DOC	dissolved organic carbon
DoD	Department of Defense
DQA	data quality assessment
DQI	data quality indicators
DQL	data quality level
DQO	data quality objectives
DV	data validation

EDD	electronic data deliverable
EPA	United States Environmental Protection Agency
EQL	estimated quantitation limit
ESAT	EPA data validation contractor
FAR	Federal Acquisition Regulations
FASTAC	Field and Analytical Services Teaming Advisory Committee
FID	flame ionization detector
FS	feasibility study
FSP	field sampling plan
FTL	field task leader
GC/MS	gas chromatograph / mass spectroscopy
H&S	health and safety
H&SM	health and safety site manager
HASP	Health and Safety Plan
HDPE	high density polyethylene
HPLC	High Pressure Liquid Chromatography
HQ	headquarters
HRGC/HRMS	High Resolution Gas Chromatography / High Resolution Mass Spectrometry
HRGC/LRMS	High Resolution Gas Chromatography / Low Resolution Mass Spectrometry
ICAL	initial calibration
ICP	inductively coupled plasma
ICP-AES	Inductively Coupled Plasma – Atomic Emission Spectrometry
ICP-MS	Inductively Coupled Plasma – Mass Spectrometry
ID	identification
IPR	initial precision and recovery
IR	infra-red
KC	Kansas City
LAN	local area network
LC	lethal concentration
LCS	laboratory control samples
LCSD	laboratory control sample duplicates
LPR	Lower Passaic River
Ltd.	limited
MDL	method detection limit
mg/kg	milligram per kilogram
mg/L	milligram per liter
MPI	Malcolm Pirnie Inc.
MS	matrix spike

MS/ MSD	matrix spikes / matrix spike duplicate
NA	not available or not applicable
ng/g	nanogram per gram
ng/kg	nanogram per kilogram
NJ	New Jersey
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
NOAA	National Oceanic Atmospheric Administration
NY	New York
°C	degrees Celsius
OPR	ongoing precision and recovery
OU	operable unit
oz	ounce
PAH	polycyclic aromatic hydrocarbon
PAL	project action limit
PCB	polychlorinated biphenyl
PCDD/PCDF	polychlorodibenzodioxin / polychlorodibenzofurans
pg/g	picogram per gram
PPE	Personal Protection Equipment
ppt	parts per thousand (salinity unit)
PQL	project quantitation limit
PQLG	project quantitation limit goal
PQO	project quality objective
PREmis	Passaic River Estuary Management Information System
PRP	potentially responsible party
PT	Performance Test
QA	quality assurance
QAC	quality assurance coordinator
QAPP	quality assurance project plan
QC	quality control
QCS	quality control sample
QL	quantitation limit
QP	quality procedure
RA	remedial action
RAS	routine analytical services
RI/FS	Remedial Investigation / Feasibility Study
RPD	relative percent difference
RPM	remedial project manager

RSCC	Regional Sample Control Coordinator
RSD	relative standard deviation
S&A	sampling and analytical
SA	self assessment
SDG	Sample Delivery Group
SM	Standard Method
SOP	standard operating procedure
SOW	scope of work
SVOC	semivolatile organic compound
TAL	target analyte list
TBD	to be determined
TCL	target compound list
TOC	total organic carbon
TOM	task order manager
TSOP	Technical Standard Operating Procedure
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WS	worksheet

Dioxin and Furans:

HpCDD	hepta-chlorodibenzo- <i>p</i> -dioxin
HpCDF	hepta-chlorodibenzofuran
HxCDD	hexa-chlorodibenzo- <i>p</i> -dioxin
HxCDF	hexa-chlorodibenzofuran
OCDD	octa-chlorodibenzo- <i>p</i> -dioxin
OCDF	octa-chlorodibenzofuran
PeCDD	penta-chlorodibenzo- <i>p</i> -dioxin
PeCDF	penta-chlorodibenzo-furan
TCDD	tetrachloro-dibenzo- <i>p</i> -dioxin
TCDF	tetrachloro-dibenzo-furan



## Introduction

CDM Federal Programs Corporation (CDM) will perform oversight and accept split surface sediment samples from the Cooperating Parties Group (CPG) during the Summer 2010 Benthic Invertebrate Community Survey.

This Quality Assurance Project Plan (QAPP) Addendum (No. 4) and the *Lower Passaic River RI/FS Oversight Final QAPP, Physical Water Column Monitoring and Generic Information for Upcoming Tasks*, dated March 2010 (hereafter referred to as the Final QAPP) is the governing document for execution of this oversight. CDM will use the various plans prepared by the CPG contractors to verify proper execution of the surface sediment sampling during the Summer 2010 Benthic Invertebrate Community Surveys, conducted as part of the RI/FS.

The March 2010 Final QAPP indicated that future oversight tasks assigned to CDM would be appended with selected worksheets. The following worksheets are included in this addendum to reflect the CPG QAPPs, *Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing* (Windward 2009) and Benthic QAPP Addendum No. 2 (Windward 2010):

- Worksheet No. 1 contains the title and approval pages for the addendum
- Worksheet No. 2 contains the QAPP identifying information
- Worksheet No. 3 provides the distribution list
- Worksheet No. 10 describes the specific problem definition
- Worksheet No. 11 provides the project quality objectives
- Worksheet No. 14 provides a summary of project tasks
- Worksheet No. 16 provides the schedule and timeline
- Worksheet No. 18 provides the proposed survey locations
- Worksheet No. 37 provides the usability assessment (field summary report)

Worksheets 12, 15, 19, 20, 23, 24, 28, 30, and 36 are also included in this addendum to address the sampling and analytical requirements of this event. The CPG's Benthic QAPP Addendum No. 2 and the CPG's original Benthic QAPP provide procedures for conducting the sediment sampling.

### 1.1 Summary of Surface Sediment Samples Collection

CDM's oversight program is designed to provide technical review, verify the accuracy of the CPG's sediment sample results and evaluate the CPG-implemented QAPPs for sediment sampling.

Oversight will include field observation and acceptance of split sediment samples from areas of small forage range fish catch success, and as part of the triad approach used to evaluate risks to benthic communities. Split samples will be analyzed for select contaminants as requested by EPA and USACE and include: PCB congeners, polychlorinated dibenzo-dioxin and furans (PCDD/PCDF) congeners, polyaromatic hydrocarbon (PAH) compounds, pesticides, SVOC, metals (including mercury and methylmercury), and physical parameters [percent moisture and total organic carbon (TOC)]. Additional oversight activities will include review of CPG-selected sampling locations to verify and supporting documents.

This oversight QAPP details the planning and execution processes for conducting field oversight; and accepting, preparing and shipping samples for analysis.

**QAPP Worksheet #1**  
**Title and Approval Page**

**Document Title: LPR Restoration Project Quality Assurance Project Plan (QAPP) Addendum No. 4, Collection of Surface Sediment Samples Co-located with the Small Forage Fish Tissue Samples**

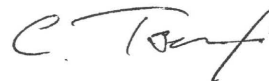
**Lead Organization: United States Army Corps of Engineers (USACE) – Northwestern Division**

**Preparer's Name and Organizational Affiliation: Jeniffer Oxford, CDM**

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**Preparation Date (Day/Month/Year): July 9, 2010**

Investigative Organization's Task Order Manager/Date:



Signature

Frank Tsang/CDM

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Doug Updike/CDM

Lead Organization's Project Manager/Date:

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Elizabeth Buckrucker/USACE – KC District

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EPA Quality Assurance Officer /Date:

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Document Control Numbering System: Not Applicable (N/A)

## QAPP Worksheet #2

### QAPP Identifying Information

<b>Site Name/Project Name:</b> Lower Passaic River (LPR) Restoration Project	<b>Title:</b> QAPP Addendum No. 4, Collection of Surface Sediment Samples co-located with Small Forage Fish Tissue Samples
<b>Site Location:</b> LPR study area, New Jersey	<b>Revision Number:</b> 0
<b>Site Number/Code:</b> NJD 980528996	<b>Revision Date:</b> NA
<b>Operable Unit (OU):</b> OU2	<b>Contractor Name:</b> CDM
<b>Contractor Number:</b> W912DQ-08-D-0018	
<b>Contract Title:</b> Unrestricted Indefinite Delivery/Indefinite Quantity, Multiple Award Contract, for Architect-Engineer (AE) Environmental Services for EPA Region 2 and the Corps of Engineers Northwestern Division.	
<b>Task Order Number:</b> 14	

1. Regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Superfund)
2. Approval entity: United States Army Corps of Engineers (USACE)
3. The QAPP is (select one):    Generic            ☒ **Project Specific**
4. Dates of negotiation: NA
5. Dates and titles of QAPP documents written for previous and current site work, if applicable:

Title	Approval Date
See Final QAPP for a full list of previous QAPP prepared for site work	
Lower Passaic River RI/FS Oversight Final QAPP, Physical Water Column Monitoring and Generic Information for Upcoming Tasks (PWCM/Generic QAPP) (referred to herein as Final QAPP)	March 2010
LPR RI/FS Oversight QAPP, Draft Addendum #1: Avian Community Survey	TBD
LPR RI/FS Oversight QAPP, Final Addendum #2: Fish Community Survey	June 8, 2010
LPR RI/FS Oversight QAPP, Final Addendum #3: Benthic Invertebrate Community Survey	June 8, 2010

6. Organizational partners (stakeholders) and connection with lead organization: EPA, USACE, New Jersey Department of Environmental Protection (NJDEP), New Jersey Department of Transportation (NJDOT), National Oceanic Atmospheric Administration (NOAA), United States Fish and Wildlife Service (USFWS)

7. Data users: Partner Agencies, CDM, Louis Berger Group, Inc., HydroQual, Inc., and stakeholders.

8. If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the attached table. Provide an explanation for their exclusions below: the Final Generic QAPP provides all the required worksheets. *This addendum addresses only the Collection of Surface Sediment Samples Co-located with the Small Forage Fish Tissue Samples during the Summer 2010 Benthic Community Survey oversight, therefore only worksheets pertinent to this task and information not previously provided are included.*

This is an oversight project; therefore, the CPG's contractors will be performing health and safety monitoring, and will be responsible for equipment calibration, inspection and maintenance (survey instruments). CDM will monitor the field activities and document observations.

**QAPP Worksheet #3**  
**Distribution List**

<b>QAPP Recipients</b>	<b>Title</b>	<b>Organization</b>	<b>Telephone Number</b>	<b>Fax Number</b>	<b>E-mail Address</b>
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## QAPP Worksheet #10 Problem Definition

### The problem to be addressed by the project:

Surface sediment sampling: Oversight will include field observation and collection of sediment split samples from areas of small forage-range fish catch success, and as part of the triad approach used to evaluate risks to benthic communities.

### The environmental questions being asked:

- Does the CPG data adequately describe the site conditions and is it representative for project decisions?
- Is the CPG and CDM data complete and accurate?
- Are the data sets comparable?
- Are the CPG versus CDM data relative percent difference (RPD)'s within the measurement performance criteria?

**Secondary data:** See Worksheet #13 of the CPG Benthic QAPP (Windward 2009)

### The possible classes of contaminants and the affected matrices:

Split sediment samples will be collected for the following chemical analyses:

- polychlorinated biphenyls (PCB) congeners
- polychlorodibenzodioxin/polychlorodibenzofurans (PCDD/PCDF) congeners
- organochlorine pesticides
- polycyclic aromatic hydrocarbons (PAHs), and semi-volatile organic compounds (SVOCs)
- metals including inorganic total mercury
- methylmercury
- percent moisture
- total organic carbon (TOC)

Split samples will not be accepted for the following analytes which will be analyzed by the CPG contractors: VOCs, alkylated PAHs, PCB Aroclors, herbicides, total petroleum hydrocarbons, butyltins, sulfide, total phosphorus, total Kjeldahl nitrogen, cyanide, ammonia, acid volatile sulfide/simultaneously extracted metals, and grain size.

### The rationale for inclusion of chemical and non-chemical analyses:

The split samples will be used to support the goals of the oversight program. The analyses selected to be split were determined to be more critical for oversight evaluation; the analyses that will not be split are ancillary parameters and not major risk drivers. VOCs were identified as contaminants of potential ecological concern in sediment but are not bioaccumulative and herbicides have low bioaccumulation potential. The field observations and split sample data will enable CDM to perform technical review and evaluation on the CPG field program, analytical data and reports and to qualitatively assess any potential bias in the CPG dataset.

**QAPP Worksheet #10**  
**Problem Definition**

**Project decision conditions (“If..., then...” statements):**

- If field work is inconsistent with the CPG QAPPs, then the field oversight staff will verify tasks with respect to the CPG’s QAPPs, and HASP and note deviations with the CPG’s field project leader and document such discussions in the Daily Field Summary Reports submitted to EPA. The CDM Task Order Manager, USACE PM and EPA RPM will be informed if there are deviations.
- If the CPG team needs to relocate survey locations, or there are any changes to the planned field program, CDM will communicate this change to the USACE and document it on the Daily Field Summary Reports.

CDM will present the data findings in a Report and submit it to the USACE and EPA who will then determine if any additional actions are required.

**QAPP Worksheet #11**  
**Project Quality Objectives /Systematic Planning Process Statements**

**Who Will Use the Data?** USACE, EPA and other partner agencies, CDM, and stakeholders (as necessary).

**What Will the Data be Used For?**

The CPG will use the sediment data to support the ecological risk assessment (ERA) and, in conjunction with tissue chemical concentrations, develop biota-sediment accumulation factors. Oversight activities will monitor the CPG-implemented surface sediment sampling program to verify that elements of the approved RI/FS QAPPs are fulfilled. The oversight field crew will also review the CPG-selected sampling locations. CDM's split sample results will be compared to the data obtained by the CPG to determine if a bias exists in the data produced by the CPG and if the data is complete and accurate and compliant with the approved QAPPs.

A comparison of the split sample data and the CPG parent sample data will only be completed for parameters that were analyzed and detected by both the CPG program and the oversight program. Data comparison will not be conducted on concentrations that are considered non-detect by either the CPG validators or oversight validators. (Note that if a consistent bias in detections is observed in either the split samples or CPG samples, an evaluation of detection limits will be completed.) The data comparison will be presented in a table showing the relative percent difference for values that are 5 times the quantitation limits. As appropriate, alternative data comparisons will be provided. For each location, a mean and variance of the sample concentrations may also be calculated. These statistics will be compared to the CPG samples. For analytical groups that contain multiple parameters (e.g., congeners), the data comparison will be completed on select parameters per chemical class.

Because of the overlap of the SVOC and PAH chemical classes, some analytes will be reported twice in the split sample program. For the data comparison, PAH results reported by Axys Analytical Services using the HRGC/LRMS method will take precedence over the PAH data generated by DESA or EPA CLP during the SVOC analysis.

CDM's QC data will be used to determine CDM's split samples data quality and comparability with the CPG's data and whether sample results are acceptable based on the established project data quality objectives (DQOs). QC sample results will be compared to the measurement performance criteria (MPC) of the data quality indicators (DQIs).

To further achieve these objectives, CDM field personnel will observe the CPG's contractors field implementation of the RI/FS QAPPs and note any deviations. Deviations will be brought to the attention of the CPG's contractor, and reported to the CDM task order manager who will communicate this information to the USACE PM and EPA RPM. These will be documented in the Daily Field Summaries and in the Final Report and include a discussion of the impact of the deviation(s) on the data quality. The CPG contractor's activities will be documented in the field logbook and oversight forms. A copy of the oversight form is provided in Appendix B of CDM's Final QAPP.

**What Type of Data is Needed?**

CDM will observe and document the surface sediment sampling activities conducted by the CPG's contractor to facilitate verification of the chemical data suitability for the ecological risk assessment. Split samples will be collected at random locations selected by the CDM Field team or as directed by the CDM Deputy TOM or the USACE/EPA project managers. Chemical and physical data, PCB congeners, PCDD/PCDF congeners, organochlorine pesticides, PAHs, and SVOCs, metals including inorganic total mercury, methylmercury, such as percent moisture and TOC will be determined from the split samples accepted from the CPG. Low limits are required for mercury and methylmercury as shown on QAPP Worksheet # 15



**QAPP Worksheet #11**  
**Project Quality Objectives /Systematic Planning Process Statements**

**How much data are needed?**

Oversight observations will be made at the locations shown on Figure 1 of the CPG's Benthic QAPP Addendum No. 2, Collection of Surface Sediment Samples Co-located with the Small Forage Fish Tissue Samples. CDM will observe the CPG's Contractor sampling at all locations and will accept split samples at approximately 10 percent of the sampling locations. Worksheets #. 11 and 18 of the CPG's Benthic QAPP Addendum No. 2 and Figure 1 (Appendix G) show the planned locations for sampling.

**How "good" do the data need to be in order to support the environmental decision?**

The oversight observation will mirror the CPG locations to allow data comparability. CDM's oversight staff will document whether the sampling program is consistent with the CPG's Benthic QAPPs. The representativeness of the data is dependent on the sampling design.

Definitive level data is required for full validation of the data. The laboratory reporting limits (contract required quantitation limits (CRQLs) for CLP data), need to be below or equal to the CPG's project required detection limits or the CPG's achievable laboratory quantitation limits. CDM will notify EPA's RSCC or subcontract laboratory and request lower reporting limits to achieve the project data quality objectives for sensitivity.

Validation of data will be performed by DESA/ EPA; however samples analyzed by a subcontract laboratory will be validated by CDM.

In addition, to ensure that measurement performance criteria for usability (criteria for measures of precision, accuracy, representativeness, comparability, completeness, and sensitivity) are met, all CDM data will be subject to a data usability assessment. The inputs will be the EPA generated validation reports and subcontract laboratory QC summaries. Measurement performance criteria for the assessment are presented in Worksheets #12, 28, 35 and 36. The results will be presented in a CDM data report.

The data usability assessment will evaluate whether appropriate field procedures were followed and whether data met the approved QAPP and project DQOs and are usable for the stated project needs.

**Where, when, and how should the data be collected?**

When - The surface sediment samples will be collected by the CPG's contractor and split with the CDM oversight staff during the summer benthic invertebrate survey. Oversight will be performed according to the CPG's schedule. The exact survey date is currently to be determined.

Where - The survey locations are shown in the CPG's Benthic QAPP Addendum No. 2, Figure 1. At locations selected by CDM in consultation with the USACE and EPA, additional sediment mass will be collected to generate sufficient mass for both sample sets.

How - Field sampling procedures are described in the CPG's Benthic QAPP (Worksheet # 11 and Attachment D) and the Benthic QAPP Addendum No. 2 which details the sampling procedures which describe how the samples will be collected. CDM will accept the split samples and prepare them for shipment.

**QAPP Worksheet #11**  
**Project Quality Objectives /Systematic Planning Process Statements**

**Who will collect and generate the data?**

CDM oversight staff will record field observations and accept splits of the selected locations while the field sampling program is being conducted by the CPG. The analytical laboratories outlined in this QAPP will generate the data.

**How will the data be reported?**

- Field observations will be recorded as described in CDM's Final QAPP using field oversight forms provided in Appendix B therein. Oversight staff will also record notes in field logbooks in accordance with TSOP 4-1 provided in Appendix C of the CDM Final QAPP.
- Results will be reported in text format and will include a discussion of the data quality, deviations from the QAPP, and oversight data comparability with the CPGs data. This review will be used to evaluate the accuracy of the CPG data.
- Sample results generated by the DESA or EPA CLP laboratory will be e-mailed to CDM for use in the data assessment and evaluation
- Sample results generated by CDM's subcontract laboratory will be e-mailed to CDM for review and validation.
- Data reporting is further covered in the CDM Final QAPP.

**How will the data be archived?**

- Hard copies of data will be kept in the Edison office until archived in the project file; if requested survey data will be uploaded to a PREmis or equivalent database. The CDM March 2010 Final QAPP contains other archival information.

### QAPP Worksheet #12-d Measurement Performance Criteria Table

<b>Matrix</b>	Sediment				
<b>Analytical Group</b>	PCB Congeners				
<b>Concentration Level</b>	Low				
Sampling Procedure	Analytical Method/ SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria <sup>1</sup> (MPC)	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
CPG Group's SOP, and QAPP  CDM will accept split	EPA Method 1668A or CBC01.2	Precision	RPD $\leq$ 40% if concentration $\geq$ 5 CRQL	Split samples and field duplicates	S & A
		Precision	$\leq$ 20% RPD; $\pm$ QL for samples $<$ 10x QL	Laboratory duplicate	A
		Accuracy/Bias	70 -130 %recovery	Certified Reference Material; Calibration Verification Sample	A
		Accuracy/Bias	60-140 %recovery	Initial Precision and Recovery	A
		Precision	RSD $\leq$ 40%		
		Accuracy/Bias	Per laboratory SOP Warning 70-130%R; Accept 50-150 %recovery	LCS or Ongoing Precision and Recovery	A
		Accuracy/Representativeness	4 $\pm$ 2 degrees Celsius 10 degrees Celsius (DV)	Temperature Blank checks Data validation (DV)	S
		Comparability	Comparable units, and methods	Data Quality assessment	S & A
		Completeness	$\geq$ 90% collection and analysis	Data Quality Assessment	S & A
		Sensitivity/accuracy	$\leq$ QLs (WS#15)	Field rinsate blanks/ Method blanks/ DV and DQA	S & A

**Note:**

1. The assigned laboratory will perform and meet all the measurement performance criteria that assess the analytical DQIs as specified in the applicable laboratory SOP.

**QAPP Worksheet #12-e**  
**Measurement Performance Criteria Table**

<b>Matrix</b>	Sediment				
<b>Analytical Group</b>	PCDD/PCDF Congeners				
<b>Concentration Level</b>	Low				
<b>Sampling Procedure</b>	<b>Analytical Method/ SOP</b>	<b>Data Quality Indicators (DQIs)</b>	<b>Measurement Performance Criteria<sup>1</sup> (MPC)</b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
CPG Group's SOP, and QAPP  CDM will accept split	USEPA Method 1613B –  Axys Analytical Services SOP MSU-018 (EPA Method 1613B)  Method is proprietary can be provided upon request	Precision	RPD $\leq$ 40% if concentration $\geq$ 5 CRQL	Split samples and field duplicates	S & A
		Precision	$\pm$ 20% of mean if concentration >10DL	Laboratory duplicate	A
		Accuracy/Bias	70-130 %recovery (or per laboratory SOP)	LCS; MS/MSD	S & A
		Precision	RPD $\leq$ 20% if >10 QL	MS/MSD	
		Accuracy/Representativeness	4 $\pm$ 2 degrees Celsius 10 degrees Celsius (DV)	Temperature Blank checks Data validation (DV)	S
		Precision	15-50% RSD or per laboratory SOP Table 1	Initial precision and recovery	A
		Accuracy/Bias	Various % recovery per laboratory SOP Table 1		
		Accuracy/Bias	15-50% RSD or per laboratory SOP Table 1	Ongoing precision and recovery	A
		Accuracy/Bias	17-130% recovery	Surrogate standards	A
		Comparability	Comparable units, and methods	Evaluated during Data Quality Assessment	S & A
		Completeness	$\geq$ 90% collection and analysis	Evaluated during Data Quality Assessment	S & A
		Sensitivity/accuracy	$\leq$ QLs (WS#15)	Field rinsate blanks/ Method blanks/ DV and DQA	S & A

**Note:**

- The assigned laboratory will perform and meet all the measurement performance criteria that assess the analytical DQIs as specified in the applicable laboratory SOP.

**QAPP Worksheet #12-f  
 Measurement Performance Criteria Table**

<b>Matrix</b>	Sediment				
<b>Analytical Group</b>	Chlorinated Pesticides				
<b>Concentration Level</b>	Low				
<b>Sampling Procedure</b>	<b>Analytical Method/ SOP</b>	<b>Data Quality Indicators (DQIs)</b>	<b>Measurement Performance Criteria<sup>1</sup> (MPC)</b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
CPG Group's SOP, and QAPP  CDM will accept split	EPA Method 1613B Modified  Lab SOP MLA-028 R05  Method is proprietary can be provided upon request	Precision	RPD $\leq$ 40% if concentration $\geq$ 5 QL	Split samples and field duplicates	S & A
		Precision	$\pm$ 20% of mean if concentration >10DL	Laboratory duplicate	A
		Accuracy/Bias	Per laboratory or method SOP	Certified Reference Material	S & A
			$\pm$ 20%	Calibration Verification	
		Accuracy/Bias	50-130% recoveries per SOP MLA-028 (Tables 4 and 5)	On-going Precision and Recovery /Matrix Spike	A
		Accuracy/Representativeness	4 $\pm$ 2 degrees Celsius 10 degrees Celsius (DV)	Temperature Blank checks Data validation (DV)	S
		Accuracy/Bias	30-150% recovery (See Table 4 for individual limits)	Surrogate	A
		Comparability	Comparable units, and methods	Evaluated during Data Quality Assessment	S & A
		Completeness	$\geq$ 90% Collection and $\geq$ 90% Valid data	Evaluated during Data Quality Assessment	S & A
		Sensitivity/accuracy	$\leq$ QLs (WS#15 and Table 4 of SOP)	Field rinsate blanks/Method blanks/ DV checked during DQA	S & A

**Note:**

The assigned laboratory must perform and meet all the quality assurance requirements specified in MLA-028 including: performance of initial and ongoing studies, calibration verification, addition of internal standards, analyses of blanks and determination of detection limits.

**QAPP Worksheet #12-g  
 Measurement Performance Criteria Table**

<b>Matrix</b>	Sediment				
<b>Analytical Group</b>	PAHs				
<b>Concentration Level</b>	Low				
<b>Sampling Procedure</b>	<b>Analytical Method/ SOP</b>	<b>Data Quality Indicators (DQIs)</b>	<b>Measurement Performance Criteria<sup>1</sup> (MPC)</b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
CPG Group's SOP, and QAPP  CDM will accept split	Axyx SOP MLA-021 based on GC/MS Isotope dilution  Method is proprietary can be provided upon request	Precision	RPD $\leq$ 40% if concentration $\geq$ 5 CRQL	Split samples and field duplicates	S & A
		Precision	$\pm$ 20% of mean if concentration $>$ 10DL	Laboratory duplicate or MS/MSD	A
		Accuracy/Bias	50-200 %recovery (Table 2 of laboratory SOP for individual limits)	Matrix Spike	S & A
		Accuracy/Bias	15-130% recovery (See Table 2 for individual limits)	Perdeuterated Surrogate	A
		Accuracy/Representativeness	4 $\pm$ 2 degrees Celsius 10 degrees Celsius (DV)	Temperature Blank checks Data validation (DV)	S
		Comparability	Comparable units, and methods	Evaluated during Data Quality assessment	S & A
		Completeness	$\geq$ 90% Collection and $\geq$ 90% Valid data	Evaluated during Data Quality Assessment	S & A
		Sensitivity/accuracy	$\leq$ QLs (WS#15) and Table 4 of laboratory SOP)	Field rinsate blanks/ Method blanks/ DV and DQA	S & A

**Note:**

1. The assigned laboratory will perform and meet all the measurement performance criteria that assess the analytical DQIs as specified in the applicable laboratory SOP.

**QAPP Worksheet #12-h**  
**Measurement Performance Criteria Table**

<b>Matrix</b>	Sediment				
<b>Analytical Group</b>	SVOC				
<b>Concentration Level</b>	Low				
<b>Sampling Procedure</b>	<b>Analytical Method/ SOP</b>	<b>Data Quality Indicators (DQIs)</b>	<b>Measurement Performance Criteria<sup>1</sup> (MPC)</b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
CPG Group's SOP, and QAPP  CDM will accept split	SW-846 Method 8270C/SOM01.2	Precision	RPD $\leq$ 40% if concentration $\geq$ 5 CRQL	Split samples and field duplicates	S & A
		Precision	Per laboratory SOP; DESA %RPD <30% (see note 2)	LCS/LCSD; MS/MSD <sup>2</sup>	A
		Accuracy/Bias	Per CLP SOW or per laboratory SOP (compound specific)	LCS; MS/MSD <sup>2</sup>	A
		Accuracy	Per CLP SOW or per laboratory SOP; DESA recoveries 30-120% for base neutrals and 20-120% for acids	Surrogate	A
		Accuracy/ Representativeness	4 $\pm$ 2 degrees Celsius 10 degrees Celsius (DV)	Temperature Blank checks Data validation (DV)	S & A
		Comparability	Comparable units, and methods	Evaluated during Data Quality assessment	S & A
		Completeness	$\geq$ 90% Collection and $\geq$ 90% Valid data	Evaluated during Data Quality Assessment	S & A
		Sensitivity/ accuracy	$\leq$ QLs (WS#15)	Field rinsate blanks/ Method blanks/ DV and DQA	S & A

**Note:**

1. DESA or CLP laboratories will perform the analysis, and meet the measurement performance and QC criteria in their SOP or Statement of Work.
2. MS/MSD analysis is not required for EPA CLP Region 2 analysis.

**QAPP Worksheet #12-i  
 Measurement Performance Criteria Table**

<b>Matrix</b>	Sediment				
<b>Analytical Group</b>	Metals				
<b>Concentration Level</b>	Low				
<b>Sampling Procedure</b>	<b>Analytical Method/ SOP</b>	<b>Data Quality Indicators (DQIs)</b>	<b>Measurement Performance Criteria<sup>1</sup> (MPC)</b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
CPG Group's SOP, and QAPP  CDM will accept split	SW-846 Method 6010B and 6020 /ILM05.4  ICP-AES and ICP-MS	Precision	RPD $\leq$ 40% if concentration $\geq$ 5 CRQL	Split samples and field duplicates	S & A
		Precision	RPD $\leq$ 35% if concentration $\geq$ 5 CRQL – DESA limit: 25% RPD	Laboratory duplicate	A
		Accuracy/Bias	90-110 %recovery	LCS;	A
			75-125 %recovery	MS/MSD	
		Accuracy/Representativeness	4 $\pm$ 2 degrees Celsius 10 degrees Celsius (DV)	Temperature Blank checks Data validation (DV)	S & A
		Comparability	Comparable units, and methods	Evaluated during Data Quality assessment	S & A
		Completeness	$\geq$ 90% Collection and $\geq$ 90% Valid data	Evaluated during Data Quality Assessment	S & A
		Sensitivity/accuracy	$\leq$ CRQLs (WS#15)	Field rinsate blanks/ Method blanks/ DV and DQA	S & A

**Note:**

1. The assigned laboratory will perform and meet all the measurement performance criteria that assess the analytical DQIs as specified in the applicable laboratory SOP.



**QAPP Worksheet #12-j  
 Measurement Performance Criteria Table**

<b>Matrix</b>	Sediment				
<b>Analytical Group</b>	Methyl mercury				
<b>Concentration Level</b>	Low				
<b>Sampling Procedure</b>	<b>Analytical Method/ SOP</b>	<b>Data Quality Indicators (DQIs)</b>	<b>Measurement Performance Criteria<sup>1</sup> (MPC)</b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
CPG Group's SOP, and QAPP  CDM will accept split	EPA Method – 1630 Laboratory TBD	Precision	RPD $\leq$ 40% if concentration $\geq$ 5 CRQL	Split samples and field duplicates	S & A
		Accuracy	RPD $\leq$ 35% for values $\geq$ 5 MDL. No more than 35% of RSDs $>$ 35%	Laboratory duplicate	A
		Accuracy/Bias	65-135 %recovery	MS/MSD	A
		Precision	RPD $\leq$ 35%	MS/MSD	A
		Accuracy	67-133%R of certified value	Ongoing Precision and Recovery (Standard Reference Material)	
		Accuracy/Representativeness	4 $\pm$ 2 degrees Celsius 10 degrees Celsius (DV)	Temperature Blank checks Data validation (DV)	S & A
		Comparability	Comparable units, and methods	Evaluated during Data Quality assessment	S & A
		Completeness	$\geq$ 90% Collection and $\geq$ 90% Valid data	Evaluated during Data Quality Assessment	S & A
		Sensitivity/accuracy	$\leq$ QLs (WS#15) $\leq$ 5MDLs	Field rinsate blanks/ Method blanks/ DV and DQA	S & A

**Note:**

1. The assigned laboratory must perform and meet all the measurement performance criteria that assess the analytical DQIs as specified in USEPA Method 1630.

### QAPP Worksheet #12-k Measurement Performance Criteria Table

<b>Matrix</b>	Sediment				
<b>Analytical Group</b>	Total mercury				
<b>Concentration Level</b>	Trace (ng/g)				
Sampling Procedure	Analytical Method/ SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria <sup>1</sup> (MPC)	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
CPG Group's SOP, and QAPP  CDM will accept split	EPA Method – 1631	Precision	RPD $\leq$ 40% if concentration $\geq$ 5 CRQL	Split samples and field duplicates	S & A
		Accuracy	RPD $\leq$ 25% for values $\geq$ 10 MDL. No more than 35% of RSDs $>$ 25%	Laboratory duplicate	A
		Accuracy/Bias	70-130 %recovery	MS/MSD	A
		Precision	Laboratory SOP or RPD $\leq$ 30-35%; RSDs $<$ 20%	MS/MSD; Initial Precision and Recovery	A
		Accuracy	Laboratory SOP or 70-130%R; 75-125%R	Ongoing Precision and Recovery; Standard Reference Material	
		Accuracy/Representativeness	4 $\pm$ 2 degrees Celsius 10 degrees Celsius (DV)	Temperature Blank checks Data validation (DV)	S & A
		Comparability	Comparable units, and methods	Evaluated during Data Quality assessment	S & A
		Completeness	$\geq$ 90% Collection and $\geq$ 90% Valid data	Evaluated during Data Quality Assessment	S & A
		Sensitivity/accuracy	$\leq$ QLs (WS#15) $\leq$ 5MDLs	Field rinsate blanks/ Method blanks/ DV and DQA	S & A

**Note:**

1. The assigned laboratory must perform and meet all the measurement performance criteria that assess the analytical DQIs as specified in USEPA Method 1631. If DESA or CLP performs the analysis, they will meet the measurement performance and QC criteria in their SOP.

**QAPP Worksheet #12-I  
 Measurement Performance Criteria Table**

<b>Matrix</b>	Sediment				
<b>Analytical Group</b>	TOC				
<b>Concentration Level</b>	Low				
<b>Sampling Procedure</b>	<b>Analytical Method/ SOP</b>	<b>Data Quality Indicators (DQIs)</b>	<b>Measurement Performance Criteria<sup>1</sup> (MPC)</b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
CPG Group's SOP, and QAPP  CDM will accept split	EPA Method - Lloyd Kahn	Precision	RPD $\leq$ 40% if concentration $\geq$ 5 CRQL	Split samples and field duplicates	S & A
		Accuracy	80-120%	Mid range CCV	A
		Accuracy/Bias	75-125 %recovery	Near detection limit standard	A
		Precision	Laboratory RPD $\leq$ 20%	Laboratory duplicate	A
		Accuracy/ Representativeness	4 $\pm$ 2 degrees Celsius 10 degrees Celsius (DV)	Temperature Blank checks Data validation (DV)	S & A
		Comparability	Comparable units, and methods	Evaluated during Data Quality assessment	S & A
		Completeness	$\geq$ 90% Collection and $\geq$ 90% Valid data	Evaluated during Data Quality Assessment	S & A
		Sensitivity/ accuracy	$\leq$ QLs (WS#15)	Field rinsate blanks/ Method blanks/ DV and DQA	S & A

**Note:**

1. The assigned laboratory must perform and meet all quality assurance requirements specified in USEPA Method Lloyd Kahn.

**QAPP Worksheet #12-m  
 Measurement Performance Criteria Table**

<b>Matrix</b>	Sediment				
<b>Analytical Group</b>	Moisture				
<b>Concentration Level</b>	Low				
<b>Sampling Procedure</b>	<b>Analytical Method/ SOP</b>	<b>Data Quality Indicators (DQIs)</b>	<b>Measurement Performance Criteria<sup>1</sup> (MPC)</b>	<b>QC Sample and/or Activity Used to Assess Measurement Performance</b>	<b>QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&amp;A)</b>
CPG Group's SOP, and QAPP  CDM will accept split	SM 2540G Modified	Precision	≤ 20% RPD	Laboratory duplicate	A

**Note:**

1. The assigned laboratory must perform and meet all quality assurance requirements specified in the method.

## QAPP Worksheet #14 Summary of Project Tasks

### Sampling Tasks:

As part of the LPR Restoration Project, the CPG is implementing an estuarine dynamic and sediment transport, and biological field sampling program to support the RI/FS. On behalf of the USACE and EPA, CDM will provide oversight and will record observations at all locations. The oversight program is designed to provide technical review and evaluation of CPG-implemented field sampling plans. Worksheet #10 discusses the oversight activities that will occur; and Worksheet #11 provides details on the data to be collected. CDM task is to observe and document the sampling conducted during the surveys.

### Analysis Tasks:

Split samples will be collected during oversight of the surface sediment sampling conducted during the summer benthic invertebrate surveys. Oversight forms (Appendix B of the CDM Final QAPP) documenting field observations will be completed by CDM's oversight staff.

**Quality Control Tasks:** CDM will observe CPG's calibration, testing and maintenance of their GPS units. CDM will document observations of the survey on field logs and in the field logbooks. The CDM Deputy Task Order Manager or designee will review the logs to ensure that the required information has been documented.

**Secondary Data:** Since this is an oversight project, no secondary data is being used directly by CDM. Data generated by the CPG - field program will be used as shown on Worksheet #11 of the CPG's QAPP Addendum No. 1: Spring and Summer 2010 Benthic Invertebrate Community Surveys.

### Data Management Tasks:

Observations of the surveys will be documented as described above and undergo QC review. The survey sheets will be maintained in the project file and used to review the CPG's reports. The information can be uploaded to the PREMIS database if required.

No analytical data will be generated.

**Documentation and Records:** Records of observed species will be documented on Appendix B – CDM Final QAPP. All field activity and deviations will be documented on the survey sheets and additional information in project logbooks.

The Benthic Invertebrate Community Survey procedures are documented in Attachment D of the CPG's Benthic QAPP and Worksheet # 11 of the CPG's Benthic QAPP Addendum No. 1: Spring and Summer 2010 Benthic Invertebrate Community Surveys. Oversight observations will be documented in the following:

1. Field logs/logbooks
2. Data Validation reports
3. COCs, ANSETS, and Trip Report

### **QAPP Worksheet #14 Summary of Project Tasks**

4. Oversight summary report
5. Data Quality and Usability Summary Report

All procedures will be documented in accordance with TSOP 4-1 provided in Appendix C of the CDM Final QAPP.

**Assessment/Audit Tasks:** See CDM Final QAPP for assessment tasks (CDM 2009)

**Data Review Tasks:** The CPG Benthic Invertebrate Community Surveys Data Report will be reviewed by CDM. A data quality evaluation will be performed based on the CPG compliance with the approved QAPP. A comparison of CDM's field staff observations and surface sediment sample results with the CPG data report will be included in the data quality evaluation and submitted to the USACE.

### QAPP Worksheet #15-d Reference Limits and Evaluation Table

**Matrix:** Sediment

**Analytical Group:** PCB Congeners by CBC01.2 or 1668A

**Concentration Level:** Low (picogram per gram [pg/g])

Analyte	CAS Number	Project Action Limit <sup>1</sup>	Project Quantitation Limit Goal (PQLG) <sup>2</sup>	CBC01.2 Analytical Method <sup>3</sup>		Method 1668A Achievable Laboratory Limits <sup>4, 5</sup>	
				MDLs	Method CRQLs	MDLs	QLs
All individual Congeners PCB-1 through PCB-209	List is provided in method	TBD	Equal to the CPG's laboratory achievable QLs for each congener	NA	2.0 ng/kg	See summary in method	0.1 to 0.2 pg/g

**Notes:**

1. Project-specific screening levels have not been developed and approved by the EPA for this project. Data Quality Levels (DQLs) for individual PCB Congeners are listed for the CPG RI/FS QAPP in the *Final Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing QAPP*, October 2009. A data quality level of 0.0227 mg/kg has been set by the CPG for PCB congeners.
2. The listed PQLGs are from the CPG's QAPP and are based on their laboratory's Quantitation Limits.
3. Method does not include MDLs which will be determined by the selected laboratory.
4. Achievable QLs listed are based on typical Axys Analytical Services laboratory detection limits expected to range from 0.1 to 2.0 pg/g, with exceptions (particularly co-eluting congeners). The assigned laboratory will report PCB congeners to sample specific detection limits, which may be different depending upon the samples. The achievable QLs shown above are generally below the PQLGs listed in the CPG RI/FS QAPP, so that split sample data should be suitable for comparison. Laboratory results will be reported in dry weight.
5. Actual QLs may be higher and are dependent on the sample moisture content and matrix effects.

### QAPP Worksheet #15-e Reference Limits and Evaluation Table

**Matrix:** Sediment

**Analytical Group:** PCDD/PCDF by EPA 1613B

**Concentration Level:** Low (ng/kg = nanogram per kilogram)

Analyte	CAS Number	Project Action Limit <sup>1</sup>	Data Quality Levels <sup>1</sup>	Project Quantitation Limit Goals (PQLGs) <sup>2</sup> (ng/kg)	EPA DLM0.2 Analytical Method <sup>3</sup>		Method 1613B Achievable Laboratory Limits	
					MDLs (ng/kg) <sup>3</sup>	Method QLs <sup>3</sup> (ng/kg)	MDLs (ng/kg) <sup>4</sup>	QLs (ng/kg) <sup>4</sup>
2378-TCDD	1746-01-6	TBD	0.12	0.49	NA	1.0	0.031	0.05
12378-PeCDD	40321-76-4	TBD	4.5	0.76	NA	5.0	0.13	0.10
123678-HxCDD	57653-85-7	TBD	45	1.35	NA	5.0	0.19	0.10
123478-HxCDD	39227-28-6	TBD	45	1.43	NA	5.0	0.18	0.10
123789-HxCDD	19408-74-3	TBD	45	1.49	NA	5.0	0.17	0.10
1234678-HpCDD	35822-46-9	TBD	450	5.79	NA	5.0	0.17	0.10
OCDD	3268-87-9	TBD	15,000	2.74	NA	10	0.83	0.5
2378-TCDF	51207-31-9	TBD	45	0.37	NA	1.0	0.015	0.05
12378-PeCDF	57117-41-6	TBD	150	0.74	NA	5.0	0.095	0.10
23478-PeCDF	57117-31-4	TBD	15	0.63	NA	5.0	0.096	0.10
123678-HxCDF	57117-44-9	TBD	45	0.7	NA	5.0	0.091	0.10
123789-HxCDF	72918-21-9	TBD	45	0.81	NA	5.0	0.12	0.10
123478-HxCDF	70648-26-9	TBD	45	0.7	NA	5.0	0.093	0.10
234678-HxCDF	60851-34-5	TBD	45	0.75	NA	5.0	0.12	0.10
1234678-HpCDF	67562-39-4	TBD	450	1.77	NA	5.0	0.099	0.10
1234789-HpCDF	55673-89-7	TBD	450	2.43	NA	5.0	0.088	0.10
OCDF	39001-02-0	TBD	15,000	2.13	NA	10	0.28	0.50

**Notes:**

1. Project-specific action levels have not been developed. Data Quality Levels (DQLs) for the individual PCDD/PCDF Congeners listed are from the CPG RI/FS QAPP, *Final Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing QAPP*, October 2009. The split sample data should be low enough for data comparison. Differences in laboratory detection limits will be considered when comparing the data.
2. The PQLGs listed are from the CPG's QAPP and are based on their laboratory's Quantitation Limits.
3. Specific MDLs for solids are not given in USEPA Method 1613B, but the QLs listed are the minimum levels published in Table 2 of USEPA Method 1613B and CLP method DLM0.2, Exhibit C, Section 1. The actual detection limits are usually dependent on the level of interference rather than instrument limitations.
4. The MDLs listed are the statistically-derived MDLs. These MDLs and QLs listed were obtained from Axys Analytical Services.



**QAPP Worksheet #15-f**  
**Reference Limits and Evaluation Table**

**Matrix:** Sediment

**Analytical Group:** Chlorinated Pesticides by EPA 1613B Modified

**Concentration Level:** Low (ng/g) (µg/kg)

Analyte	CAS Number	Project Action Limit <sup>1</sup>	Data Quality Levels <sup>1</sup>	Project Quantitation Limit Goal (PQLG) <sup>2</sup>	SOM01.2 Analytical Method		Achievable Laboratory Limits <sup>3</sup>	
					MDLs	Method CRQLs	MDLs	QLs
2,4'-DDD	53-19-0	TBD	2,000	0.1	NA	Not on CLP list	0.008	0.02
2,4'-DDE	3424-82-6	TBD	1,420	0.1	NA	Not on CLP list	0.006	0.02
2,4'-DDT	789-02-6	TBD	1,000	0.1	NA	Not on CLP list	0.008	0.02
4,4,DDD	72-54-8	TBD	1,000	0.1	NA	3.3	0.008	0.02
4,4,DDE	72-55-9	TBD	1,420	0.1	NA	3.3	0.009	0.02
4,4,DDT	50-29-3	TBD	1,000	0.1	NA	3.3	0.010	0.02
Aldrin	309-00-2	TBD	2,000	0.1	NA	1.7	0.079	0.02
alpha-BHC	319-84-6	TBD	940	0.1	NA	1.7	0.027	0.02
beta-BHC	319-85-7	TBD	940	0.1	NA	1.7	0.015	0.02
cis-Chlordane (alpha Chlordane)	5103-71-9	TBD	20	0.1	NA	1.7	0.024	0.02
cis-Nonachlor	5103-73-1	TBD	200,000	0.1	NA	Not on CLP list	0.027	0.02
delta-BHC	319-86-8	TBD	940	0.1	NA	1.7	0.007	0.02
Dieldrin	60-57-1	TBD	20	0.1	NA	3.3	0.019	0.05
Endosulfan I	959-98-8	TBD	37,000,000	0.1	NA	3.3	0.029	0.05
Endosulfan II	33213-65-9	TBD	37,000,000	0.1	NA	3.3	0.057	0.05
Endosulfan sulfate	1031-07-8	TBD	37,000,000	0.1	NA	3.3	0.052	0.05
Endrin	72-20-8	TBD	2,220	0.1	NA	3.3	0.031	0.05
Endrin Aldehyde	7421-93-4	TBD	2,670	0.1	NA	3.3	0.027	0.05
Endrin ketone	53494-70-5	TBD	2,670	0.1	NA	3.3	0.029	0.05
gamma-BHC (Lindane)	58-89-9	TBD	940	0.1	NA	1.7	0.012	0.02
Hexachlorobenzene	118-74-1	TBD	2,000	0.1	NA	On SVOC list	0.009	0.02
Heptachlor	76-44-8	TBD	300	0.1	NA	1.7	0.024	0.02
Heptachlor Epoxide	1024-57-3	TBD	600	0.1	NA	1.7	0.014	0.05
Methoxychlor	72-43-5	TBD	6,000	0.1	NA	17	0.005	0.10
Toxaphene	8001-35-2	TBD	Not on CPG	list of analytes	NA	170	NA	NA
Oxychlordane	27304-13-8	TBD	200,000	0.1	NA	Not on CLP list	0.043	0.02
Trans-Chlordane (gamma Chlordane)	5103-74-2	TBD	20	0.1	NA	1.7	0.015	0.02
Trans-Nonachlor	3734-49-4	TBD	200,000	0.1	NA	NS	0.021	0.02

**Notes:** 1. Project-specific action levels have not been developed. Data Quality Levels (DQLs) listed are from the CPG RI/FS QAPP, *Final Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing QAPP*, October 2009. The split sample data should be low enough for data comparison. Differences in laboratory limits will be considered in data comparison. 2. The listed PQLGs are from the CPG's QAPP and are based on their laboratory's Quantitation Limits. 3. MDLs are statistically-derived; these limits are from Axys Analytical Services. Results will be reported in dry weight. Actual QLs may be higher and are dependent on the sample moisture content and matrix effects.

### QAPP Worksheet #15-g Reference Limits and Evaluation Table

**Matrix:** Sediment

**Analytical Group:** PAH by Axys SOP MLA-021

**Concentration Level:** Low (µg/kg)

Analyte	CAS Number	Project Action Limit <sup>1</sup>	Data Quality Levels <sup>1</sup>	Project Quantitation Limit Goal <sup>2</sup>	Analytical Method <sup>3</sup>			Achievable Laboratory Limits <sup>4</sup>	
					MDLs	SOM01.2 CRQLs	8270 QLs	MDLs	QLs
1-Methylnaphthalene	90-12-0	TBD	22,000	1.0	NA	Not Listed	Not Listed	NA	1.0
1-Methylphenanthrene	832-69-9	TBD	1,700,000	1.0	NA	Not Listed	Not Listed	0.28	1.0
2,3,5-Trimethylnaphthalene	2245-38-7	TBD	3,900	1.0	NA	Not Listed	Not Listed	0.60	1.0
2,6-Dimethylnaphthalene	581-42-0	TBD	3,900	1.0	NA	Not Listed	Not Listed	0.25	1.0
2-Methylnaphthalene	91-57-6	TBD	20.2	1.0	NA	170	660	0.29	1.0
Acenaphthene	83-32-9	TBD	6.71	1.0	NA	170	660	0.16	0.5
Acenaphthylene	208-96-8	TBD	5.87	1.0	NA	170	660	0.20	0.5
Anthracene	120-12-7	TBD	46.9	1.0	NA	170	660	0.41	0.5
Benzo[a]anthracene	56-55-3	TBD	31.7	1.0	NA	170	660	0.18	0.5
Benzo[a]pyrene	50-32-8	TBD	15.0	1.0	NA	170	660	0.14	0.5
Benzo[b]fluoranthene	205-99-2	TBD	150.0	1.0	NA	170	660	0.61	
Benzo[e]pyrene	192-97-2	TBD	170,000	1.0	NA	Not Listed	Not Listed	0.17	0.5
Benzo[g,h,i]perylene	191-24-2	TBD	170.0	1.0	NA	170	660	0.21	1.0
Benzo[j]fluoranthene	205-82-3	TBD	240 (for k)	1.0	NA	Not Listed	Not Listed	0.10	0.5
Benzo[k]fluoranthene	207-08-9	TBD	240 (for k)	1.0	NA	170	660	0.10	0.5
Chrysene	218-01-9	TBD	57.1	1.0	NA	170	660	0.20	0.5
Dibenzo[a,h]anthracene	53-70-3	TBD	6.22	1.0	NA	170	660	0.23	1.0
Dibenzothiophene	135-65-0	TBD	NA	1.0	NA	Not Listed	Not Listed	0.23	1.0
Fluoranthene	206-44-0	TBD	111.0	1.0	NA	170	660	0.17	0.5
Fluorene	86-73-7	TBD	19.0	1.0	NA	170	660	0.17	0.5
Indeno[1,2,3-c,d]-pyrene	193-39-5	TBD	150.0	1.0	NA	170	660	0.17	1.0
Naphthalene	91-20-3	TBD	34.6	1.0	NA	170	660	1.55	0.5
Perylene	198-55-0	TBD	170,000	1.0	NA	Not Listed	Not listed	0.18	1.0
Phenanthrene	85-01-8	TBD	41.9	1.0	NA	170	660	0.13	0.5
Pyrene	129-00-0	TBD	53.0	1.0	NA	170	660	0.18	0.5

**Notes:**

1. Project-specific action levels have not been developed. The listed Data Quality Levels (DQLs) are taken from the CPG RI/FS QAPP, *Final Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing*, October 2009, Revision 0.
2. The PQLGs reported are from the CPG's QAPP and are based on their laboratory's Quantitation Limits. The split sample data should be low enough for data comparison; lower limits than those listed in methods 8270 and SOM01.2 will be required. Differences in laboratory detection limits will be considered when comparing the data.
3. Specific MDLs are not given in the listed methods.
4. Achievable MDLs listed are the statistically-derived MDLs. These MDLs and QLs are based on Axys Analytical Service typical sample specific detection limits. Results will be reported in dry weight. Actual QLs may be higher and are dependent on the sample moisture content and matrix effects. MDLs and QLs are limits that an individual laboratory can achieve when performing the analytical method.

### QAPP Worksheet #15-h Reference Limits and Evaluation Table

**Matrix:** Sediment

**Analytical Group:** SVOCs by EPA SOM01.2 or SW-846, 8270C/D

**Concentration Level:** Low (mg/kg)

Analyte	CAS Number	Project Action Limit <sup>1</sup>	Project Quantitation Limit Goal <sup>2</sup>	Analytical Method <sup>3</sup>			Achievable DESA Laboratory Limits	
				MDLs	8270 CRQLs <sup>3</sup>	SOM01.2 CRQLs	MDLs <sup>4</sup>	QLs <sup>4</sup>
1,1'-Biphenyl	92-52-4	262	0.4	NA	NA	0.17	0.017	120
2,2'-Oxybis (1-Chloropropane)	108-60-1	3.50	0.4	NA	0.66	0.17	0.017	NL
2,4,5-Trichlorophenol <sup>5</sup>	95-95-4	0.003	0.4	NA	0.66	0.17	0.036	0.12
2,4,6-Trichlorophenol <sup>5</sup>	88-06-2	0.006	0.4	NA	0.66	0.17	0.044	0.12
2,4-Dichlorophenol <sup>5</sup>	120-83-2	0.005	0.8	NA	0.66	0.17	0.041	0.12
2,4-Dimethylphenol <sup>5</sup>	105-67-9	0.304	0.4	NA	0.66	0.17	0.041	0.12
2,4-Dinitrophenol <sup>5</sup>	51-28-5	0.00621	1.6	NA	3.3	0.33	0.360	0.12
2,4-Dinitrotoluene <sup>5</sup>	121-14-2	0.0144	0.4	NA	0.66	0.17	0.015	0.12
2,6-Dinitrotoluene	606-20-2	0.70	0.4	NA	0.66	0.17	0.015	0.12
2-Chloronaphthalene <sup>5</sup>	91-58-7	0.417	0.4	NA	0.66	0.17	0.015	0.12
2-Chlorophenol <sup>5</sup>	95-57-8	0.008	0.4	NA	0.66	0.17	0.028	0.12
2-Methylnaphthalene <sup>5</sup>	91-57-6	0.0202	0.4	NA	0.66	0.17	0.015	0.12
2-Methylphenol	95-48-7	310	0.4	NA	0.66	0.17	0.036	0.12
2-Nitroaniline	88-74-4	18.0	0.4	NA	3.3	0.33	0.024	0.12
2-Nitrophenol	88-75-5	1,800 <sup>e</sup>	0.4	NA	0.66	0.17	0.035	0.12
3,3'-Dichlorobenzidine <sup>5</sup>	91-94-1	0.127	0.4	NA	1.3	0.17	0.058	0.12
3-Nitroaniline	99-09-2	18.0	0.4	NA	3.3	0.33	0.013	0.12
4,6-Dinitro-2-methylphenol <sup>5</sup>	534-52-1	0.610	1.6	NA	3.3	0.17	0.035	0.12
4-Bromophenyl-phenylether	101-55-3	NA <sup>f</sup>	0.4	NA	0.66	0.17	0.022	0.12
4-Chloro-3-methylphenol	59-50-7	10,000	0.4	NA	1.3	0.17	0.040	0.12
4-Chloroaniline	106-47-8	2.4	0.4	NA	1.3	0.17	0.014	0.12
4-Chlorophenyl-phenyl ether	7005-72-3	NA <sup>f</sup>	0.4	NA	0.66	0.17	0.022	0.12
4-Methylphenol	106-44-5	31.0	0.4	NA	0.66	0.17	0.045	0.12
4-Nitroaniline	100-01-6	24.0	0.4	NA	NA	0.33	0.021	0.12
4-Nitrophenol <sup>5</sup>	100-02-7	0.0133	0.8	NA	3.3	0.33	0.043	0.12
Acenaphthene <sup>5</sup>	83-32-9	0.0067	0.4	NA	0.66	0.17	0.018	0.12
Acenaphthylene <sup>5</sup>	208-96-8	0.0059	0.4	NA	0.66	0.17	0.014	0.12
Acetophenone	98-86-2	2.00	0.4	NA	NA	0.17	0.016	0.12
Anthracene <sup>5</sup>	120-12-7	0.0469	0.4	NA	0.66	0.17	0.014	0.12
Atrazine	1912-24-9	2.10	0.4	NA	NA	0.17	0.021	0.12
Benzaldehyde	100-52-7	780	0.4	NA	NA	0.17	0.097	0.12
Benzo(a)anthracene <sup>5</sup>	56-55-3	0.0317	0.4	NA	0.66	0.17	0.020	0.12

### QAPP Worksheet #15-h Reference Limits and Evaluation Table

**Matrix:** Sediment

**Analytical Group:** SVOCs by EPA SOM01.2 or SW-846, 8270C/D

**Concentration Level:** Low (mg/kg)

Analyte	CAS Number	Project Action Limit <sup>1</sup>	Project Quantitation Limit Goal <sup>2</sup>	Analytical Method <sup>3</sup>			Achievable DESA Laboratory Limits	
				MDLs	8270 CRQLs <sup>3</sup>	SOM01.2 CRQLs	MDLs <sup>4</sup>	QLs <sup>4</sup>
Benzo(a)pyrene <sup>5</sup>	50-32-8	0.015	0.4	NA	0.66	0.17	0.014	0.12
Benzo(b)fluoranthene <sup>5</sup>	205-99-2	0.150	0.4	NA	0.66	0.17	0.018	0.12
Benzo(g,h,i)perylene <sup>5</sup>	191-24-2	0.170	0.4	NA	0.66	0.17	0.016	0.12
Benzo(k)fluoranthene <sup>5</sup>	207-08-9	0.240	0.4	NA	0.66	0.17	0.017	0.12
bis-(2-Chloroethoxy)methane	111-91-1	18.0	0.4	NA	0.66	0.17	0.017	0.12
bis-(2-Chloroethyl)ether <sup>5</sup>	111-44-4	0.190	0.4	NA	0.66	0.17	0.016	0.12
bis(2-Ethylhexyl)phthalate <sup>5</sup>	117-81-7	0.182	0.4	NA	0.66	0.17	0.017	0.12
Butylbenzylphthalate <sup>5</sup>	85-68-7	0.063	0.4	NA	0.66	0.17	0.017	0.12
Caprolactam	105-60-2	3,100	0.4	NA	NA	0.17	0.027	0.12
Carbazole	86-74-8	24.0	0.4	NA	NA	0.17	0.014	0.12
Chrysene <sup>5</sup>	218-01-9	0.0571	0.4	NA	0.66	0.17	0.015	0.12
Dibenzo(a,h)-anthracene <sup>5</sup>	53-70-3	0.00622	0.4	NA	0.66	0.17	0.016	0.12
Dibenzofuran	132-64-9	NA	0.4	NA	0.66	0.17	0.016	0.12
Diethylphthalate <sup>5</sup>	84-66-2	0.006	0.4	NA	0.66	0.17	0.015	0.12
Dimethylphthalate	131-11-3	46.0	0.4	NA	0.66	0.17	0.016	0.12
Di-n-butylphthalate <sup>5</sup>	84-74-2	0.058	0.4	NA	NA	0.17	0.021	0.12
Di-n-octylphthalate	117-84-0	46.0	0.4	NA	0.66	0.17	0.015	0.12
Fluoranthene <sup>5</sup>	206-44-0	0.111	0.4	NA	0.66	0.17	0.015	0.12
Fluorene <sup>5</sup>	86-73-7	0.0190	0.4	NA	0.66	0.17	0.016	0.12
Hexachlorobenzene <sup>5</sup>	118-74-1	0.00200	0.4	NA	0.66	0.17	0.019	0.12
Hexachlorobutadiene <sup>5</sup>	87-68-3	0.0013	0.4	NA	0.66	0.17	0.016	0.12
Hexachloroethane <sup>5</sup>	67-72-1	0.073	0.4	NA	0.66	0.17	0.022	0.12
Hexachlorocyclopentadiene <sup>5</sup>	77-47-4	0.0070	0.4	NA	0.66	0.17	0.031	0.12
Indeno(1,2,3-cd)-pyrene <sup>5</sup>	193-39-5	0.150	0.4	NA	0.66	0.17	0.012	0.12
Isophorone <sup>5</sup>	78-59-1	0.432	0.4	NA	0.66	0.17	0.029	0.12
Naphthalene <sup>5</sup>	91-20-3	0.0346	0.4	NA	0.66	0.17	0.013	0.12
Nitrobenzene <sup>5</sup>	98-95-3	0.145	0.4	NA	0.66	0.17	0.015	0.12
n-Nitroso-di-n-propylamine <sup>5</sup>	621-64-7	0.0690	0.4	NA	0.66	0.17	0.021	0.12
n-Nitrosodiphenylamine	86-30-6	99.0	0.4	NA	0.66	0.17	0.022	0.12
Pentachlorophenol <sup>5</sup>	87-86-5	0.017	0.4	NA	3.3	0.33	0.043	0.12
Phenanthrene <sup>5</sup>	85-01-8	0.0419	0.4	NA	0.66	0.17	0.013	0.12
Phenol <sup>5</sup>	108-95-2	0.0491	0.4	NA	0.66	0.17	0.025	0.12
Pyrene <sup>5</sup>	129-00-0	0.0530	0.4	NA	0.66	0.17	0.015	0.12

1. At this time, project-specific screening levels or action levels have not been developed. The values listed are the Data Quality Levels (DQLs) taken from the CPG RI/FS QAPP, *Final Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing*, October 2009, Revision 0. The split sample data QLs should be low enough for data comparison. Differences in laboratory detection limits will be considered when comparing the data.
2. The PQLGs reported are from the CPG's QAPP and are based on their laboratory's Quantitation Limits.
3. Specific MDLs are not given in the listed methods.
4. Achievable MDLs and QLs are limits that an individual laboratory can achieve when performing the analytical method. Actual MDLs and QLs will vary based on sample-specific factors. The QLs listed are based on detection limits achieved by the DESA Laboratories.
5. The project action limit for highlighted cells are below the method 8270 quantitation limits and/or the SOM01.2 as shown above. The laboratory requester should ensure that the laboratory is provided with the PALs and project quantitation limit goals to attempt to achieve the sensitivity requirements above and to match the CPG's laboratory limits.

**Additional note:**

Analyte may also be reported from the lower limits GC/MS method for PAH analysis; the PAH method results will take precedence over SOM01.2/SW846 Method 8270C results. The analytes 1-methylnaphthalene, 1-methylphenanthrene, 2,3,5-trimethylnaphthalene, 2,6-dimethylnaphthalene, benzo(e)pyrene, dibenzothiophene, and perylene, will be reported by the PAH method only.

### QAPP Worksheet #15-i Reference Limits and Evaluation Table

**Matrix:** Sediment

**Analytical Group:** Metals SW-846, 6010B/6020 or CLP ILM05.4

**Concentration Level:** Low (mg/kg)

Analyte	CAS Number	Project Action Limit <sup>1</sup>	Project Quantitation Limit Goal (PQLG) <sup>2</sup>	Analytical Method <sup>5</sup>			Achievable DESA Limits <sup>4</sup>	
				MDLs <sup>3</sup>	Subcontractor Method QLs	CLP Method CRQLs	MDLs	QLs <sup>4, 5</sup>
Aluminum	7429-90-5	7,700	2	NA	TBD	20	Not available	100
Antimony	7440-36-0	2.0	0.05	NA	TBD	6	0.22	2
Arsenic	7440-38-2	0.39	0.5	NA	TBD	1	0.35	0.8
Barium	7440-39-3	1,500	0.05	NA	TBD	20	0.24	10
Beryllium	7440-41-7	16	0.02	NA	TBD	0.5	0.02	0.3
Cadmium	7440-43-9	0.6	0.02	NA	TBD	0.5	0.02	0.3
Calcium	7440-70-2	NA	10	NA	TBD	500	12.57	50
Chromium	7440-47-3	26	1.0	NA	TBD	1	0.34	0.5
Cobalt	7440-48-4	2.3	0.02	NA	TBD	5	0.03	2
Copper	7440-50-8	16	0.1	NA	TBD	2.5	0.26	1
Iron	7439-89-6	5,500	2	NA	TBD	10	Not available	5
Lead	7439-92-1	31	0.02	NA	TBD	1	0.23	0.8
Magnesium	7439-95-4	NA	3	NA	TBD	500	5.06	50
Manganese	7439-96-5	260	0.05	NA	TBD	1.5	0.33	0.5
Nickel	7440-02-0	16	0.2	NA	TBD	4	0.09	2
Potassium	7440-09-7	NA	30	NA	TBD	500	12.36	50
Selenium	7782-49-2	1.0	0.1	NA	TBD	3.5	0.22	2
Silver	7440-22-4	0.5	0.02	NA	TBD	1	0.06	0.5
Sodium	7440-23-5	NA	60	NA	TBD	500	22.48	100
Thallium	7440-28-0	0.51	0.02	NA	TBD	2.5	3.14	2
Titanium	7440-28-0	100,000	0.2	NA	TBD	2 (MA1486.0)	Not listed	Not listed
Vanadium	7440-62-2	38.1	0.6	NA	TBD	5	0.4	2
Zinc	7440-66-6	120	0.5	NA	TBD	6	1.57	2

**Notes:**

1. At this time, project-specific screening levels or action levels have not been developed.
2. The PQLGs listed are the Data Quality Levels (DQLs) taken from the CPG RI/FS QAPP, *Final Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing*, October 2009, Revision 0. The split sample data should be low enough for data comparison. Differences in laboratory detection limits will be considered when comparing the data.
3. Method MDLs are not specified.
4. The achievable QLs listed are for DESA Laboratories by ICP-AES. The assigned laboratory may need to also employ ICP-MS; the detection limits will differ. CDM will request modified analyses to achieve limits similar to the CPG's laboratory.
5. Laboratory results will be reported in dry weight. Actual QLs may be higher and are dependent on the sample moisture content and matrix effects.

**QAPP Worksheet #15-j**  
**Reference Limits and Evaluation Table**

**Matrix:** Sediment

**Analytical Group:** Mercury by EPA 1630/1631

**Concentration Level:** Low (ng/g)

Analyte	CAS Number	Project Action Limit <sup>1</sup>	Project Quantitation Limit Goal (PQLG) <sup>2</sup>	Analytical Method			Achievable Laboratory Limits <sup>4, 5</sup>	
				MDLs <sup>3</sup>	Method QLs	ILM05.4 CLP Method CRQLs	MDLs	QLs
Mercury	7439-97-6	150 ng/g	0.15	NA	See method EPA 1631	0.1/10 <sup>-3</sup>	0.04	1
Methyl mercury	22967-92-6	150 ng/g	0.025	NA	See method EPA 1630	NA	0.02	0.05

**Notes:**

1. At this time, project-specific screening levels or action levels have not been developed.
2. The PQLGs listed are the Data Quality Levels (DQLs) taken from the CPG RI/FS QAPP, *Final Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing*, October 2009, Revision 0. The split sample data should be low enough for data comparison. Differences in laboratory detection limits will be considered when comparing the data based on the laboratory achievable quantitation limits and should be adequate for data comparison.
3. Method MDLs are not specified.
4. The achievable QLs listed are for Accutest Laboratories as an example. The subcontract laboratory has not been determined at this time. The assigned laboratory detection limits will differ.
5. Laboratory results will be reported in dry weight. Actual QLs may be higher and are dependent on the sample moisture content and matrix effects.

**QAPP Worksheet #15-k**  
**Reference Limits and Evaluation Table**

**Matrix:** Sediment

**Analytical Group:** TOC by Lloyd Kahn Method

**Concentration Level:** Low (mg/kg)

Analyte	CAS Number	Project Action Limit <sup>1</sup>	Project Quantitation Limit Goal (PQLG) <sup>2</sup>	Analytical Method		Achievable Laboratory Limits <sup>3,</sup> <sup>4</sup>	
				MDLs (mg/kg)	Method QLs (mg/kg)	MDLs (mg/kg)	QLs (mg/kg)
TOC	D3590-89-02	Not Available	0.01%	Not listed	100	25.15	100
Moisture	2540G Modified	Not Available	Not applicable	NA	Not applicable	Not Available	Not Available

**Notes:**

1. At this time, there are no project-specific screening levels or action levels approved by the EPA for this parameter for this project. Differences in laboratory detection limits will be considered when comparing the data.
2. The target PQLG listed is based on the laboratory's achievable QL.
3. The QL and MDL are based on Accutest Laboratories data as an example. The laboratory's QL is anticipated to be low enough to allow comparison of the split sample data to the CPG data. If another laboratory were assigned to perform this test their detection limits may differ.
4. Laboratory results will be reported in dry weight. Actual QLs may be higher and are dependent on the sample moisture content and matrix effects.



**QAPP Worksheet #16**  
**Project Schedule Timeline Table**

<b>Activities</b>	<b>Organization</b>	<b>Anticipated Date(s) of Initiation</b>	<b>Anticipated Date of Completion</b>	<b>Deliverable</b>	<b>Deliverable Due Date</b>
Prepare and submit: Oversight QAPP Addendum for Surface Sediment Sampling to EPA and USACE	CDM	June 4, 2010	June 24, 2010	UFP-QAPP addendum	June 2010
Prepare and submit: Revised oversight QAPP Addendum for Surface Sediment Sampling	CDM	As soon as comments are received	July 9, 2010	UFP-QAPP addendum	July 9, 2010
Oversight/ acceptance of splits and sample handling activities	CDM	Mid July 2010 - TBD	10 days after commencement date	Summary report of field notes including photographs	To be determined
Laboratory Analysis	EPA CLP/ DESA and/subcontract laboratories	July through August 2010	To be determined; data collection will be dependent on the CPG schedule	Data Package	To be determined; will be dependent on the CPG schedule  For standard analyses, 21 days after the last sample is received; however, specialized analyses may take additional time
Validation and verification of sample data	CDM	August 2010	August 2010	Validated data report	To be determined; will be dependent on CPG schedule
Oversight /Data Evaluation	CDM	To be determined	To be determined	Oversight Summary Report/ Data Quality Summary Report	To be determined
Review Surface Sediment Sampling Data Report	CDM	90 days after each survey event	1 month after receipt of report	Comments on Benthic Invertebrate Community Survey Data Report	1 month after receipt of report

**QAPP Worksheet #18**  
**Sampling Locations and Methods/SOP Requirements Table**

Survey Location ID	Depth	Analytical Group	Concentration Level	Estimated Number of Samples (identify field duplicates)	Sampling SOP Reference	Rationale for Sampling Location
Refer to QAPP prepared by Windward Environmental (Windward) for the CPG	Sediment split samples	Analytical group for split samples includes: PCB congeners, PCDD/PCDF, chlorinated pesticides, PAH and SVOC, metals (including mercury, and methylmercury), percent moisture, and TOC	Low	All sampling locations will be observed.  Approximately 10 percent of CPG samples will be split.	Attachment D of CPG Benthic QAPP (SOP-Collection and Processing of Sediment Grab Samples) of CPG QAPP (Windward 2009) and Benthic QAPP Addendum (see footnotes)	Sediment split samples will be collected judgmentally by the on-site oversight staff in consultation with the TOM, deputy TOM and USACE/EPA

**Notes:**

Refer to the QAPP prepared by Windward for the CPG (Worksheet # 10 and 18 and Figure 1) titled, *Benthic QAPP Addendum No. 1: Spring and Summer 2010 Benthic Invertebrate Community Surveys* (April 14, 2010) for sampling information.

### QAPP Worksheet #19 Analytical SOP Requirements Table

Matrix <sup>1</sup>	Analytical Group	Concentration Level	Analytical and Preparation Method/SOP Reference <sup>2</sup>	Sample Volume	Containers (number, size, and type)	Preservation Requirements (chemical, temperature, light protected) <sup>3</sup>	Maximum Holding Time <sup>4</sup> (preparation/analysis)
Sediment	PCB Congeners	Low	CBC01.2 or EPA 1668A for HRGC/HRMS	10 g minimum	1- 4 oz amber glass jar	Maintain in the dark at less than 4 °C from collection until receipt at the laboratory	If stored at less than -10° C solid multiphase samples can be stored for up to one year. Sample extracts can be stored at less than -10 degrees Celsius for up to one year
	Pesticides	Low	EPA Method 1613B Modified (HRGC/HRMS)	Minimum mass = 50 g (combine mass for pesticide, PCDD/PCDF, and PAH)	1-4 oz amber glass jar (ship one jar for pesticide, PCDD/PCDF, and PAH)	Maintain in the dark at less than 4 degrees Celsius (°C) from collection until receipt at the laboratory	14 days to extraction, 40 days to analysis at 4° C. Pesticide samples can be stored 299 days if frozen.
	PCDD/PCDF Congeners	Low	EPA 1613B for HRGC/HRMS			Maintain in the dark at less than 4 °C from collection until receipt at the laboratory	If stored at less than -10°C, solid multiphase samples can be stored up to one year. Sample extracts can be stored at less than -10°C for up to one year
	PAH	Low	Axys SOP MLA-021			Maintain in the dark at less than 4 °C from collection until receipt at the laboratory	14 days to extraction, 40 days to analysis at 4°C (For this study PAH samples can be stored 199 days if frozen.)
	Percent Moisture	Low	SM2540G Modified (Axys SOP EGN007-07)	Minimum mass = 5-10 g	1- 4 oz amber	Cool to 4 °C ± 2 °C	Analyze as soon as possible
Sediment	TCL SVOC	Low	SOM01.2 or SW846 Method 8270C	Minimum mass= 30 grams	1- 8 oz glass jar	Cool to 4 °C ± 2 °C	14 days to extraction; 40 days to analysis at 4 °C
	Metals	Low	SW846 Method 6010B/6020 or ILM05.4	Minimum mass = 2 g	(ship one jar for SVOC, metals, TOC, and percent moisture)	Cool to 4 °C ± 2 °C	6 months
	TOC	Low	Lloyd Kahn	Minimum mass = 1 g			14 days
Sediment	Total mercury and methyl mercury	Low	EPA 1630/1631	Minimum mass = 1 g	1- 4 oz pre-tared polyethylene bottle	Cool to 4 °C ± 2 °C and freeze as soon as possible	1 year [ if aliquoted, weighed and frozen at <-15 °C]

**Notes:**

- 1: Sediment matrix refers to sediment split sample analyzed for sediment chemical concentration.
- 2: DESA and CLP Laboratory SOPs are not available. The Axys laboratory SOPs are available upon request. A backup CDM analytical subcontract laboratory for TOC, mercury and methyl mercury is TBD.
- 3: The actual jar size may vary depending on the need of the assigned laboratory. The sampler should confirm sample volumes with the laboratory prior to mobilizing to the field.

**QAPP Worksheet #20**  
**Field Quality Control Sample Summary Table**

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Split Sampling Locations	No. of Field Duplicate Pairs	No. of Extra Volume Laboratory QC (e.g., MS/MSD) Samples	No. of Equipment Blanks	No. of Trip. Blanks	No of PE Samples	Total No. of Samples
Sediment	PCB congeners	Low	CBC01.2 or EPA Method 1668A for HRGC/HRMS	Sample locations and number of samples to be determined (TBD)	1 per 20 or less (total of 1 duplicate)	1 per 20 or less (total of 1 sample)	0	0	0	TBD
Sediment	PCDD/PCDF congeners	Low	EPA Method 1613B for HRGC/HRMS AxyS SOP MSU-020	TBD	1 per 20 or less (total of 1 duplicate)	1 per 20 or less (total of 1 sample)	0	0	0	TBD
Sediment	Chlorinated Pesticides	Low	EPA Method 1613B Modified (HRGC/HRMS) AxyS SOP MLA-028	TBD	1 per 20 or less (total of 1 duplicate)	1 per 20 or less (total of 1 sample)	0	0	0	10% Splits, exact numbers to be determined
Sediment	PAHs	Low	AxyS SOP MLA-021	TBD	1 per 20 or less (total of 1 duplicate)	1 per 20 or less (total of 1 sample)	0	0	0	TBD
Sediment	TCL SVOCs	Low	SOM01.2 or SW846 Method 8270C	TBD	1 per 20 or less (total of 1 duplicate)	1 per 20 or less (total of 1 sample)	0	0	0	TBD
Sediment	TAL metals	Low	ILM05.4/SW846 Method 6010B/6020	TBD	1 per 20 or less (total of 1 duplicate)	1 per 20 or less (total of 1 sample)	0	0	0	TBD
Sediment	Mercury and methylmercury	Low	EPA Method 1630/1631	TBD	1 per 20 or less (total of 1 duplicate)	1 per 20 or less (total of 1 sample)	0	0	0	TBD
Sediment	TOC	Low	EPA Method Lloyd Kahn	TBD	1 per 20 or less (total of 1 duplicate)	1 per 20 or less (total of 1 sample)	0	0	0	TBD
Sediment	Percent moisture	Low	SM2540B	TBD	1 per 20 or less (total of 1 duplicate)	1 per 20 or less (total of 1 sample)	0	0	0	TBD

**Notes:**

The FASTAC decision process will be used for obtaining laboratory services except for chlorinated pesticides, dioxin/furans, PAH, and moisture which will be analyzed by AxyS laboratory. The AxyS subcontract laboratory will be used due to the difficulty of analyzing the sample matrix for the selected analyses in order to ensure accurate results, to reduce uncertainties in the measurements and to obtain data comparable with data from previous and future surveys.

The exact number of samples to be split will be determined in the field and is based on the CPG fish tissue collection success of small forage range fish sampling during the late spring/early summer 2010 effort.

**QAPP Worksheet #23**  
**Analytical SOP References Table**

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
CBC01.2 or EPA Method 1668A for HRGC/HRMS	<i>Analysis of PCB Congeners by EPA Method 1668A.</i> May 2006.	Definitive	PCB Congeners	HRGC/HRMS	EPA Headquarters Laboratory	No
EPA 1613B for HRGC/HRMS Axys SOP: MSU-020	<i>Analysis of Polychlorinated Dioxins and Furans by EPA Method 1613B.</i> June 2005.	Definitive	PCDD/PCDF Congeners	HRGC/HRMS	Axys Analytical Services Laboratory 2045 Mills Road West Sidney, British Columbia, Canada Contact: Candice Navaroli Phone: 1-888-373-0881	No
EPA 1613B Modified/ Axys SOP: MLA-028	<i>Analysis of Organochlorine Pesticides by HRGC/HRMS in [Water, Solids, Biosolids and Tissue].</i> September 2009.	Definitive	Chlorinated Pesticides	HRGC/HRMS	Axys Analytical Services	Analyte list per WS#15
Axys SOP: MLA-021	<i>Analysis of Polycyclic Aromatic Hydrocarbons (PAH) and Alkylated PAH by method MLA-021.</i> February 2009.	Definitive	PAH	HRGC/HRMS	Axys Analytical Services	No
SM2540G Modified	<i>Total, Fixed, and Volatile Solids in Soil and Semisolid Samples. Standard Methods for Examination of Water and Wastewater.</i> 19 <sup>th</sup> Edition 1995.	Definitive	Moisture	Furnace, Balance, Oven	Axys Analytical Services	Yes
SOM01.2	<i>EPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Multi-Media, Multi-Concentration, Organic Analytical Service for Superfund.</i> August 2007.	Definitive	TCL SVOC	GC/MS	CLP	No
C-90 (SOM01.2 or 8270C)	<i>Analysis of Base /Neutral and Acid Compounds in Aqueous, Soil/ Sediment and Waste Oil/Waste Organic Solvent Samples.</i> Rev 2.0, March 2007.				DESA	No

**QAPP Worksheet #23**  
**Analytical SOP References Table**

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
C-109	<i>Determination of Trace Elements in Aqueous Trace Metals in Aqueous, Soil/Sediment/Sludge-ICP-AES. Rev 2.0. March 2007.</i>	Definitive	Metals	ICP-AES	DESA	No
ILM05.4	<i>CLP SOW for Multi-Media, Multi-Concentration Inorganic Analysis. December 2006</i>	Definitive	Metals	ICP-AES ICP-MS	CLP	No
C-112	<i>Trace Metals in Aqueous, Soil/Sediment/Sludge/Waste Oil/Organic and Biological tissue by Inductively Coupled Plasma-Mass Spectrometry. Rev 2.0. March 2007.</i>	Definitive	Metals	ICP-MS	DESA	No
EPA 1631	<i>Total Mercury in Aqueous Samples by Cold Vapor Atomic Fluorescence. March 2009.</i>	Definitive	Total mercury	CVAFS	CDM Subcontract: TBD	No
EPA 1630	<i>Methylmercury in Tissue and Sediment by Cold Vapor Atomic Fluorescence. August 2007.</i>	Definitive	Methyl mercury	CVAFS	CDM Subcontract: TBD	No
C-88	<i>Total Organics in Soil. Rev 1.0. January 2005.</i>	Definitive	TOC	Carbon Analyzer	DESA	No
Lloyd Kahn	<i>Determination of TOC in Sediment. July 1998 and Attachment B, Supplemental Technical Direction and Additional QC Procedures</i>				CDM subcontract laboratory TBD	No

**Notes:**

The titles above may change dependent on the assigned laboratories.

1: As necessary, the assigned laboratories will perform additional clean-up of split samples (via gel permeation chromatography) prior to analysis of organic compounds.

### QAPP Worksheet #24 Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference <sup>1</sup>
TOC Analyzer	Per vendor, instrument manual and laboratory SOP	Check daily	Calibration and corrective action as per laboratory SOP and Manufacturer's instruction. No samples shall be analyzed if instrument calibration exceeds the acceptance criteria.		Laboratory analyst / QA officer - TBD	Lloyd Kahn SOP  DESA - C-88  Subcontract Laboratory - TBD
HRGC/ HRMS and HRGC/LRMS	Initial Calibration and calibration verification check: Per laboratory SOP	After set up, prior to run and after instrument changes or failures of checks.	% RSD and % recovery per laboratory SOPs.	Check, correct; re-calibrate and rerun all samples analyzed after last valid calibration check	Laboratory analyst / QA officer - TBD	Axys SOP for PAH analysis: MLA-021  EPA Lab SOP for PCB Congeners by CBC01.2 or 1668A - TBD
	Calibration checks: CCVs per laboratory SOP	Daily: Beginning of run and after every 10 samples and at end of analytical run	% recovery per laboratory SOP	Check, correct; re-calibrate and rerun all samples analyzed after last valid cal check	Laboratory analyst / QA officer - TBD	Axys SOP for Chlorinated pesticides by EPA 1613B Mod: MLA-028  Axys SOP for PCDD/ PCDF by EPA 1613B: MSU-020
GC/MS  for TCL SVOC - SOM01.2 or SW-846 8270C	Initial calibration: 5 points standards	Upon award of the contract, whenever the laboratory takes corrective action which may change or affect the initial calibration criteria (e.g., ion source cleaning or repair, column replacement, etc.), or if the continuing calibration acceptance criteria have not been met.	relative response factor (RRF) $\geq$ minimum acceptable RRF listed in Table 5 of procedure;  All target compounds, initial relative standard deviation (RSD) $\leq$ 10% or 20% and correlation coefficient (r) $>$ 0.995. %RSD $\leq$ value in Table 5 of SOM01.2 or other laboratory SOP as applicable.	Inspect system for problems (e.g., clean ion source, change the column, service the purge and trap device), correct problem, re-calibrate.	EPA CLP Laboratory GC/MS Technician	DESA SOPs: C-89 & C-90  CLP Laboratory - TBD

**QAPP Worksheet #24**  
**Analytical Instrument Calibration Table**

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference <sup>1</sup>
GC/MS	Continuing calibration (CCV)	Once every 12 hours or as per laboratory SOPs	%D ≤15% or <30% or as per laboratory SOPs	Inspect system; correct problem; recalibrate the instrument, reanalyze affected samples and standards.	EPA CLP Laboratory GC/MS Technician	SOM01.2/8270C
GC/MS	Calibration Standards Verification	Each lot of standards	As per laboratory established control limits	Inspect system; correct problem; re-run standard and affected samples	EPA CLP Laboratory GC/MS Technician	SOM01.2/8270C
GC/MS	Tuning	Daily: every 12 hours	Response factors and RRF as method specified	Inspect system; correct problem; re-run standard and affected samples	EPA CLP Laboratory GC/MS Technician	SOM01.2/8270C
CVAFS	Per method and laboratory SOP	Calibration	Per method/ laboratory SOP. ICAL ≤15%RSD.	Inspect the system, correct problem, re-calibrate, and re-analyze samples.	Assigned laboratory personnel	EPA 1630/1631 Subcontract Laboratory - TBD
		ICV: Check daily when instrument is in use	85-115% R for Total mercury; 80-120%R for methyl mercury			
		CCV: Beginning and after every 10 samples	77-123% R for total mercury; 67-133%R for methyl mercury			
ICP-AES and ICP-MS	See ILM05.4; as per instrument manufacturer's recommended procedures	Initial calibration: daily or once every 24 hours and each time the instrument is set up.	ICP-AES: As per instrument manufacturer's recommended procedures, with at least 2 standards.	Inspect the system, correct problem, re-calibrate, and re-analyze samples.	TBD DESA Laboratory, EPA CLP Laboratory or Subcontractor	ILM05.4 or SW-846, 6010B/6020 SOPs:  DESA Lab: C-109 & C-112
	Initial calibration	Daily; after tuning and optimizing instrument	r >0.995; minimum of 3 standards and a blank	Repeat analysis; re-prepare calibration standards and reanalyze	ICP-AES / ICP-MS Technician/ analyst / QA officer	CLP: NA



**QAPP Worksheet #24**  
**Analytical Instrument Calibration Table**

<b>Instrument</b>	<b>Calibration Procedure</b>	<b>Frequency of Calibration</b>	<b>Acceptance Criteria</b>	<b>Corrective Action (CA)</b>	<b>Person Responsible for CA</b>	<b>SOP Reference<sup>1</sup></b>
	ICV	Before sample analysis	90-110% recovery; source of standard separate from calibration standards	Re-calibrate instrument; prepare fresh ICV standards; do not analyze samples until problem is corrected		
ICP-AES and ICP-MS	Reporting Limit Standard	After initial calibration verification standard	80-120% recovery or concentration $\leq$ 30% difference (from true value)	Re-analyze failed standard	TBD  DESA Laboratory, EPA CLP Laboratory or Subcontractor	ILM05.4 or SW-846, 6010B/6020 SOPs:  DESA Lab: C-109 & C-112
	CCV	Every 10 samples and at end of analytical sequence	90-110% recovery; source of standard separate from calibration standards	Re-check; re-calibrate and rerun all samples analyzed after last valid CCV		
ICP-MS	Continuing calibration	Beginning and end of run; 10% frequency or every 2 hours during an analysis run	As per instrument manufacturer's recommended procedures, with at least 2 standards. A minimum of three replicate integrations are required for data acquisition.		ICP-AES / ICP-MS Technician/analyst / QA officer	CLP: NA

**Notes:**

1. The analytical laboratory is TBD as per FASTAC and as requested by the USACE and EPA. The general SOP numbers are shown where a specific SOP reference was not available. General GC/MS calibration requirements are presented. Instruments used for analyses follow the calibration frequencies outlined in the method SOP. Laboratory specific calibration information is maintained by the laboratories; method specific calibration information is detailed in the methods.

### QAPP Worksheet #28-d QC Samples Table

<b>Matrix</b>	Sediment					
<b>Analytical Group</b>	PCB Congeners					
<b>Concentration Level</b>	Low (pg/g)					
<b>Sampling SOP(s)</b>	See Worksheet #21					
<b>Analytical Method/SOP Reference</b>	EPA 1668A or CBC01.2					
<b>Sampler's Name</b>	TBD					
<b>Field Sampling Organization</b>	CDM					
<b>Analytical Organization</b>	EPA Headquarters Laboratory					
<b>No. of Sample Locations</b>	See Worksheets #18 & 20					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per 20 samples	< QL	If samples non-detect or if lowest sample result is >10 times the blank-no action; otherwise redigest and reanalyze	Laboratory Analyst	Accuracy/Sensitivity	No analyte > QL
Laboratory Duplicate	1 per 20 samples	≤ 20% RPD; ±QL for samples <10x QL	Flag outliers	Laboratory Analyst	Precision	RPD ≤ 20%
Certified Reference Material or Quality Control Sample	Periodically at least quarterly	70-130%R;	Check standards; recalibrate if required	Laboratory Analyst	Accuracy	70-130%R;
Calibration Verification Sample	Beginning of each 12-hour shift	70-130%R;	Adjust and/or recalibrate	Laboratory Analyst	Accuracy/bias	70-130%R;
Initial Precision and Recovery	Prior to sample analysis	Per laboratory SOP	Investigate and correct	Laboratory Analyst	Accuracy	60-140%R ≤ 40% RSD
Ongoing Precision and Recovery	1 per batch of 20 samples	Per laboratory SOP	Identify source of problem, recalibrate if needed/ make other adjustments and reanalyze	Laboratory Analyst	Accuracy	Warning 70-130%R; Accept 50-150%R
Sample splits and field duplicates	1 per 20 samples	None	Data assessor to inform PM if MPC is exceeded; address in data quality assessment	CDM ASC	Precision	≤ 40% RPD (for results ≥ 5QL)
Temperature Blank	1 per cooler	≤ 6 degrees Celsius	Note outlier in laboratory narrative. Inform CDM of failure and need for additional coolant; check packing procedure	Laboratory Analyst	Accuracy/bias	≤ 10 degrees Celsius for data validation

### QAPP Worksheet #28-e QC Samples Table

<b>Matrix</b>	Sediment					
<b>Analytical Group</b>	PCDD/PCDF					
<b>Concentration Level</b>	Low (mg/L)					
<b>Sampling SOP(s)</b>	See Worksheet #21					
<b>Analytical Method/SOP Reference</b>	EPA 1613B/ MLA-017					
<b>Sampler's Name</b>	TBD					
<b>Field Sampling Organization</b>	CDM					
<b>Analytical Organization</b>	Axys Analytical Services Ltd.					
<b>No. of Sample Locations</b>	See Worksheet #18 & 20					
<b>QC Sample:</b>	<b>Frequency/Number</b>	<b>Method/SOP QC Acceptance Limits</b>	<b>Corrective Action</b>	<b>Person(s) Responsible for Corrective Action</b>	<b>Data Quality Indicator (DQI)</b>	<b>Measurement Performance Criteria</b>
Method Blank	1 per 20 samples	Per laboratory SOP	If samples non-detect or if lowest sample result is >10 times the blank-no action; otherwise redigest and reanalyze	Laboratory Analyst	Accuracy/Sensitivity	No analyte > QL
Laboratory Duplicate	1 per 20 samples	Per laboratory SOP	Investigate and correct; Flag outliers	Laboratory Analyst	Precision	± 20% of mean if sample concentration >10x DL
Initial Precision and Recovery	Prior to sample analysis	Per laboratory SOP	Investigate and correct	Laboratory Analyst	Accuracy	Per method/laboratory SOP
Ongoing Precision and Recovery	1 per batch of 20 samples	Per laboratory SOP	Identify source of problem, make other adjustments; redigest if needed and reanalyze	Laboratory Analyst	Accuracy	Individual laboratory established limits per SOP
Sample splits and field duplicates	1 per 20 samples	None	Data assessor to inform PM if MPC is exceeded; address in data quality assessment	CDM ASC	Precision	≤ 40% RPD (for results ≥ 5QL)
Temperature Blank	1 per cooler	≤ 6 degrees Celsius	Note outlier in laboratory narrative. Inform CDM of failure and need for additional coolant; check packing procedure	Laboratory Analyst	Accuracy/bias	≤ 10 degrees Celsius for data validation

**Notes:**

The assigned laboratory also must perform and meet all the measurement performance criteria that assess the analytical DQIs as specified in EPA Method 1613B.

### QAPP Worksheet #28-f QC Samples Table

<b>Matrix</b>	Sediment					
<b>Analytical Group</b>	Chlorinated Pesticides					
<b>Concentration Level</b>	Low					
<b>Sampling SOP(s)</b>	See Worksheet #21 – split of CPG samples					
<b>Analytical Method/SOP Reference</b>	EPA 1613B Modified/ MLA-028					
<b>Sampler's Name</b>	TBD					
<b>Field Sampling Organization</b>	CDM					
<b>Analytical Organization</b>	Axy's Analytical Services Ltd.					
<b>No. of Sample Locations</b>	See Worksheet #18 & 20					
<b>QC Sample:</b>	<b>Frequency/Number</b>	<b>Method/SOP QC Acceptance Limits</b>	<b>Corrective Action</b>	<b>Person(s) Responsible for Corrective Action</b>	<b>Data Quality Indicator (DQI)</b>	<b>Measurement Performance Criteria</b>
Method Blank	per extract batch	Per laboratory SOP	Investigate and correct per laboratory SOP	Laboratory Analyst	Accuracy/Sensitivity	No analyte > QL
Laboratory Duplicate	1 per 20 samples	Per laboratory SOP	Investigate and correct; Flag outliers	Laboratory Analyst	Precision	± 20% of mean if sample concentration >10x DL
Initial Calibration	Prior to sample analysis	Per laboratory SOP	Investigate and correct	Laboratory Analyst	Accuracy	Per laboratory SOP
Calibration Verification; Certified Reference Material	Beginning of each 12-hour shift; Periodically at least quarterly	Per laboratory SOP	Check standards; recalibrate if required	Laboratory Analyst	Accuracy	Tables 4 and 5 of laboratory SOP
Ongoing Precision and Recovery/ MS	1 per batch of 20 samples prior to sample analysis	50-130% Recovery per Table 4 and 5 of laboratory SOP	Identify source of problem, make other adjustments as per laboratory SOP	Laboratory Analyst	Accuracy	See method limits; for individual compound limits see Tables 4 and 5 of laboratory SOP
Sample splits and field duplicates	1 per 20 samples	None	Data assessor to inform PM if MPC is exceeded; address in data quality assessment	CDM ASC	Precision	≤ 40% RPD (for results ≥ 5QL)
Temperature Blank	1 per cooler	≤ 6 degrees Celsius	Note outlier in laboratory narrative. Inform CDM of failure and need for additional coolant; check packing procedure	Laboratory Analyst	Accuracy/bias	≤ 10 degrees Celsius for data validation

**Notes:**

The assigned laboratory also must perform and meet all the measurement performance criteria that assess the analytical DQIs as specified in EPA Method 1613B and laboratory SOP; such as performance of initial and ongoing studies, calibration verification, addition of internal standards, analyses of blanks and determination of detection limits.

**QAPP Worksheet #28-g**  
**QC Samples Table**

<b>Matrix</b>	Sediment					
<b>Analytical Group</b>	PAH					
<b>Concentration Level</b>	Low					
<b>Sampling SOP(s)</b>	See Worksheet #21 – split of CPG samples					
<b>Analytical Method/SOP Reference</b>	Laboratory SOP, MLA-021					
<b>Sampler's Name</b>	TBD					
<b>Field Sampling Organization</b>	CDM					
<b>Analytical Organization</b>	Axys Analytical Services Ltd.					
<b>No. of Sample Locations</b>	See Worksheet #18 & 20					
<b>QC Sample:</b>	<b>Frequency/Number</b>	<b>Method/SOP QC Acceptance Limits</b>	<b>Corrective Action</b>	<b>Person(s) Responsible for Corrective Action</b>	<b>Data Quality Indicator (DQI)</b>	<b>Measurement Performance Criteria</b>
Method Blank	per extract batch	Per laboratory SOP	Investigate and correct per laboratory SOP	Laboratory Analyst	Accuracy/Sensitivity	No analyte > QL
Laboratory Duplicate (MS/MSD)	1 per 20 samples	Per laboratory SOP	Investigate and correct; reanalyze affected samples. Flag outliers	Laboratory Analyst	Precision	± 20% of mean if sample concentration >10x DL
Matrix Spike	1 per 20 samples or with each group of field samples	Per laboratory SOP	Investigate and correct. Document in data summary	Laboratory Analyst	Accuracy/Precision	50-200% Recovery per laboratory SOP
Perdeuterated Surrogate	Every field and QC sample, standards, blanks	Per laboratory SOP	Identify source of problem, make other adjustments and reanalyze	Laboratory Analyst	Accuracy	50-130% Recovery - See Laboratory SOP Table 2
Sample splits and field duplicates	1 per 20 samples	None	Data assessor to inform PM if MPC is exceeded; address in data quality assessment	CDM ASC	Precision	≤ 40% RPD (for results ≥ 5*QL)
Temperature Blank	1 per cooler	≤ 6 degrees Celsius	Note outlier in laboratory narrative. Inform CDM of failure and need for additional coolant; check packing procedure	Laboratory Analyst	Accuracy/bias	≤ 10 degrees Celsius for data validation

**Note:**

The assigned laboratory also must perform the QA/QC sample analyses and meet all the measurement performance criteria that assess the analytical DQIs, such as laboratory duplicates and matrix spike duplicates for precision, matrix spikes, Deuterated monitoring compounds for accuracy, and blanks and method detection limits for sensitivity. The laboratory personnel must follow all the corrective actions required by the laboratory SOP.

**QAPP Worksheet #28-h**  
**QC Samples Table**

<b>Matrix</b>	Sediment					
<b>Analytical Group</b>	SVOC					
<b>Concentration Level</b>	Low					
<b>Sampling SOP(s)</b>	See Worksheet #21 – split of CPG samples					
<b>Analytical Method/SOP Reference</b>	SOM01.2 or 8270C					
<b>Sampler's Name</b>	TBD					
<b>Field Sampling Organization</b>	CDM					
<b>Analytical Organization</b>	As per FASTAC [DESA or EPA CLP Laboratory]					
<b>No. of Sample Locations</b>	See Worksheet #18 & 20					
<b>QC Sample:</b>	<b>Frequency/ Number</b>	<b>Method/SOP QC Acceptance Limits</b>	<b>Corrective Action</b>	<b>Person(s) Responsible for Corrective Action</b>	<b>Data Quality Indicator (DQI)</b>	<b>Measurement Performance Criteria</b>
Method Blank	per extract batch	Per method/laboratory SOP	Investigate and correct per laboratory SOP	Laboratory Analyst	Accuracy/ Sensitivity	No analyte > QL
Temperature Blank	1 per cooler	≤ 6 degrees Celsius	Note outlier in laboratory narrative. Inform CDM of failure and need for additional coolant; check packing procedure	Laboratory Analyst	Accuracy/bias	≤ 10 degrees Celsius for data validation
Sample splits and field duplicates	1 per 20 samples	None	Data assessor to inform PM if MPC is exceeded; address in data quality assessment	CDM ASC	Precision	≤ 40% RPD (for results ≥ 5QL)
MS/MSD	1 per 20 samples or with each group of field samples	Per method/laboratory SOP	Investigate and correct; reanalyze affected samples. Flag outliers Document in case narrative	Laboratory Analyst	Precision	Individual limits listed as per laboratory established limits
MS/MSD and LCS		Note: not required for Region 2 CLP analysis		Laboratory Analyst	Accuracy	Individual limits listed as per laboratory established limits

Matrix		Sediment					
Analytical Group		SVOC					
Concentration Level		Low					
Sampling SOP(s)		See Worksheet #21 – split of CPG samples					
Analytical Method/SOP Reference		SOM01.2 or 8270C					
Sampler's Name		TBD					
Field Sampling Organization		CDM					
Analytical Organization		As per FASTAC [DESA or EPA CLP Laboratory]					
No. of Sample Locations		See Worksheet #18 & 20					
QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
DMC/Surrogates	Every field and QC sample, standards, blanks	Per method/laboratory SOP: DESA Recovery limits: 30-120% for base neutrals and 20-120% for acids  (see below for CLP limits)		Identify source of problem, make adjustments and reanalyze as required	Laboratory Analyst	Accuracy	Recovery - See Laboratory SOP limits
		Phenol-d5	17-103 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits (Section 11.3.4, Page D48/SVOC of SOM01.2)			
		Bis(2-chloroethyl)ether-d8	12-98 %R				
		2-Chlorophenol-d4	13-101 %R				
		4-Methylphenol-d8	8-100 %R				
		Nitrobenzene-d5	16-103 %R				
		2-Nitrophenol-d4	16-104 %R				
		2,4-Dichlorophenol-d3	23-104 %R				
		4-Chloroaniline-d4	1-145 %R				
		Dimethylphthalate-d6	43-111 %R				
		Acenaphthylene-d8	20-97 %R				
		4-Nitrophenol-d4	16-166 %R				
		Fluorene-d10	40-108 %R				
		4,6-Dinitro-2-methylphenol-d2	1-121 %R				
		Anthracene-d10	22-98 %R				
Pyrene-d10	51-120 %R						
Benzo(a)pyrene-d12	43-111 %R						
Internal Standards	all samples	50-200% of area, ± 30 second retention time shift		Check calculations and instruments, reanalyze affected samples	DESA or CLP Laboratory GC/MS Technician	Accuracy	50-200% of area, ± 30 second retention time shift

**Notes:** The assigned laboratory also must perform the QA/QC sample analyses and meet all the measurement performance criteria that assess the analytical DQIs as specified in 8270, such as matrix spike duplicates for precision, matrix spikes, deuterated monitoring compounds for accuracy, and blanks and method detection limits for sensitivity. The laboratory personnel must follow all the corrective actions required by the laboratory SOP or subcontract Statement of work (SOW).

### QAPP Worksheet #28-i QC Samples Table

<b>Matrix</b>	Sediment					
<b>Analytical Group</b>	Metals (no mercury)					
<b>Concentration Level</b>	Low					
<b>Sampling SOP(s)</b>	See Worksheet #21 – split of CPG samples					
<b>Analytical Method/SOP Reference</b>	SW-846 6010B/6020 or ILM05.4					
<b>Sampler's Name</b>	TBD					
<b>Field Sampling Organization</b>	CDM					
<b>Analytical Organization</b>	As per FASTAC [DESA or EPA CLP Laboratory]					
<b>No. of Sample Locations</b>	See Worksheet #18 & 20					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Sample splits and field duplicates	1 per 20 samples	None	Data assessor to inform PM if MPC is exceeded; address in data quality assessment	CDM ASC	Precision	≤ 40% RPD (for results ≥ 5QL)
Temperature Blank	1 per cooler	≤ 6 degrees Celsius	Note in laboratory narrative. CDM will use more coolant; check packing procedure	Laboratory Analyst	Accuracy/bias	≤ 10 degrees Celsius for data validation
Preparation Blank	1 per 20 samples	No constituent > CRQL	Suspend analysis until source rectified; re-digest and reanalyze affected samples	Laboratory Analyst	Accuracy/Sensitivity	No result > CRQL
Laboratory duplicate	1 per 20 samples or each group	± 20% RPD**	Investigate and correct; Flag outliers; Note in case narrative	Laboratory Analyst	Precision	≤ 35% RPD if result > 5CRQL
Spike	1 per 20 samples	75-125%R*	Flag outliers	Laboratory Analyst	Accuracy	75-125%R*
Post-Digestion Spike	after any analyte (except Ag) fails spike %R	75-125%R	Flag outliers	Laboratory Analyst	Accuracy	75-125%R
Interference Check Sample [ICP Analysis Only]	beginning, end and periodically during run (twice each 8 hr)	± 2 *CRQL of true value or ± 20% of true value, whichever is greater	Check calculations and instruments, reanalyze affected samples	Laboratory Analyst	Sensitivity	± 2 * CRQL of true value or ± 20% of true value, whichever is greater
Laboratory Control Sample	1 per 20 samples	Control limits established by EPA*	Suspend analysis rectify source; re-digest and reanalyze affected samples	Laboratory Analyst	Accuracy	90-110%R

**Notes:**

The assigned laboratory also must perform the QA/QC sample analyses and meet all the measurement performance criteria that assess the analytical DQIs as specified in the method or laboratory SOP and or subcontract Statement of work (SOW) as applicable.



**QAPP Worksheet #28-j**  
**QC Samples Table**

<b>Matrix</b>	Sediment					
<b>Analytical Group</b>	Methyl Mercury					
<b>Concentration Level</b>	Low					
<b>Sampling SOP(s)</b>	See Worksheet #21 – split of CPG samples					
<b>Analytical Method/SOP Reference</b>	EPA 1630					
<b>Sampler's Name</b>	TBD					
<b>Field Sampling Organization</b>	CDM					
<b>Analytical Organization</b>	CDM Subcontract Laboratory-TBD					
<b>No. of Sample Locations</b>	See Worksheet #18 & 20					
<b>QC Sample:</b>	<b>Frequency/Number</b>	<b>Method/SOP QC Acceptance Limits</b>	<b>Corrective Action</b>	<b>Person(s) Responsible for Corrective Action</b>	<b>Data Quality Indicator (DQI)</b>	<b>Measurement Performance Criteria</b>
Sample splits and field duplicates	1 per 20 samples	None	Data assessor to inform PM if MPC is exceeded; address in data quality assessment	CDM ASC	Precision	≤ 40% RPD (for results ≥ 5QL)
Temperature Blank	1 per cooler	≤ 6 degrees Celsius or frozen as applicable	Note in laboratory narrative. CDM will use more coolant; check packing procedure	Laboratory Analyst	Accuracy/bias	≤ 10 degrees Celsius or per WS 19 and 37 for data validation
Preparation Blank	3 per 20 samples or batch	No constituent > QL Per laboratory SOP	Suspend analysis until source rectified; re-distill and reanalyze affected samples if results are <10 times the blank	Laboratory Analyst	Accuracy/Sensitivity	No result > 5*MDL
Laboratory duplicate	1 per 20 samples	≤ 35% RPD or ± 2 x PQL if sample < 5PQL or per laboratory SOP	Investigate and correct; Flag outliers; Note in case narrative. Multiple failures require re-distillation and reanalysis.	Laboratory Analyst	Precision	≤ 35% RPD if result >5QL
Certified Reference Material or Ongoing Precision and Recovery Samples	1 per 20 samples or with each group of field samples	Per laboratory SOP	Check calculations and instruments, reanalyze affected samples	Laboratory Analyst	Accuracy	67-133%R of true value
MS/MSD	1 per 20 samples or with each group of field samples	Per laboratory SOP	Investigate matrix effects and note in data narrative.	Laboratory Analyst	Accuracy	65-135%R
				Laboratory Analyst	Precision	RPD ≤35%

**Notes:**

The assigned laboratory also must perform the QA/QC sample analyses and meet all the measurement performance criteria that assess the analytical DQIs as specified in the method or laboratory SOP and or subcontract Statement of work (SOW) as applicable.

### QAPP Worksheet #28-k QC Samples Table

<b>Matrix</b>	Sediment					
<b>Analytical Group</b>	Total Mercury					
<b>Concentration Level</b>	Low					
<b>Sampling SOP(s)</b>	See Worksheet #21 – split of CPG samples					
<b>Analytical Method/SOP Reference</b>	EPA 1631					
<b>Sampler's Name /Organization</b>	TBD /CDM					
<b>Analytical Organization</b>	CDM Subcontract Laboratory-TBD					
<b>No. of Sample Locations</b>	See Worksheet #18 & 20					
QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Sample splits and field duplicates	1 per 20 samples	None	Data assessor to inform PM if MPC is exceeded; address in data quality assessment	CDM ASC	Precision	≤ 40% RPD (for results ≥ 5QL)
Temperature Blank	1 per cooler	≤ 6 degrees Celsius or frozen as applicable	Note in laboratory narrative. CDM will use more coolant; check packing procedure	Laboratory Analyst	Accuracy/bias	≤ 10 degrees Celsius or per WS 19 and 37 for data validation
Preparation Blank	3 per 20 samples or batch	Per laboratory SOP	Reanalyze. Suspend analysis until source rectified; re-distill and reanalyze affected samples if results are <10 times the blank	Laboratory Analyst	Accuracy/Sensitivity	No result > 5MDL
Laboratory duplicate	1 per 20 samples	Per laboratory SOP	Investigate and correct; Flag outliers; Note in case narrative. Multiple failures require re-distillation and reanalysis.	Laboratory Analyst	Precision	≤ 35% RPD if result >5CRQL
Certified Reference Material or Ongoing Precision and Recovery Samples	1 per 20 samples or with each group of field samples	Per laboratory SOP	Check calculations and instruments, reanalyze affected samples. Report in case narrative.	Laboratory Analyst	Accuracy	70-130%R for OPR <20 RSD for IPR 75-125%R for CRM/IPR
MS/MSD	1 per 20 samples or with each group of field samples	Per laboratory SOP	Investigate matrix effects and note in data narrative.	Laboratory Analyst	Accuracy	70-130%R
				Laboratory Analyst	Precision	RPD ≤35% (30 per method)

**Notes:**

The assigned laboratory also must perform the QA/QC sample analyses and meet all the measurement performance criteria that assess the analytical DQIs as specified in the method or laboratory SOP and or subcontract Statement of work (SOW) as applicable.

**QAPP Worksheet #28-I**  
**QC Samples Table**

<b>Matrix</b>	Sediment					
<b>Analytical Group</b>	TOC					
<b>Concentration Level</b>	Low					
<b>Sampling SOP(s)</b>	See Worksheet #21 – split of CPG samples					
<b>Analytical Method/SOP Reference</b>	Lloyd Kahn					
<b>Sampler's Name</b>	TBD					
<b>Field Sampling Organization</b>	CDM					
<b>Analytical Organization</b>	As per FASTAC [DESA or CDM Subcontract Laboratory]					
<b>No. of Sample Locations</b>	See Worksheet #18 & 20					
<b>QC Sample:</b>	<b>Frequency/Number</b>	<b>Method/SOP QC Acceptance Limits</b>	<b>Corrective Action</b>	<b>Person(s) Responsible for Corrective Action</b>	<b>Data Quality Indicator (DQI)</b>	<b>Measurement Performance Criteria</b>
Preparation Blank	per extract batch	≤ 100 mg/kg	Investigate and correct ; recalibrate if still outlying	Laboratory Analyst	Accuracy/Sensitivity	No result > QL
Laboratory duplicate	1 per 20 samples or with each group of field samples	≤ 20% RPD	Investigate and correct; reanalyze affected samples. Flag outliers Document in case narrative	Laboratory Analyst	Precision	≤ 25% RPD
Detection Limit Verification Standard	per batch	± 25% of true value	Investigate and correct; reanalyze with affected samples.	Laboratory Analyst	Accuracy	± 25% of true value
Sample splits and field duplicates	1 per 20 samples	None	Data assessor to inform PM if MPC is exceeded; address in data quality assessment	CDM ASC	Precision	≤ 40% RPD (for results ≥ 5QL)
Temperature Blank	1 per cooler	≤ 6 degrees Celsius	Note outlier in laboratory narrative. Inform CDM of failure and need for additional coolant; check packing procedure	Laboratory Analyst	Accuracy/bias	≤ 10 degrees Celsius for data validation

**Notes:**

The assigned laboratory also must perform the QA/QC sample analyses and meet all the measurement performance criteria that assess the analytical DQIs as specified in the method or laboratory SOP and or subcontract Statement of work (SOW) as applicable.

**QAPP Worksheet #28-m  
 QC Samples Table**

<b>Matrix</b>	Sediment					
<b>Analytical Group</b>	Moisture					
<b>Concentration Level</b>	Low					
<b>Sampling SOP(s)</b>	See Worksheet #21 – split of CPG samples					
<b>Analytical Method/SOP Reference</b>	ASTM 4643-93					
<b>Sampler's Name</b>	TBD					
<b>Field Sampling Organization</b>	CDM					
<b>Analytical Organization</b>	Axys Analytical Services Ltd. /analyzed with low level PAHs					
<b>No. of Sample Locations</b>	See Worksheet #18 & 20					
<b>QC Sample:</b>	<b>Frequency/Number</b>	<b>Method/SOP QC Acceptance Limits</b>	<b>Corrective Action</b>	<b>Person(s) Responsible for Corrective Action</b>	<b>Data Quality Indicator (DQI)</b>	<b>Measurement Performance Criteria</b>
Laboratory duplicate	1 per 20 samples or with each group of field samples	≤ 20% RPD	Investigate and correct; reanalyze affected samples. Flag outliers Document in case narrative	Laboratory Analyst	Precision	≤ 20% RPD

**Notes:**

The assigned laboratory also must perform the QA/QC sample analyses and meet all the measurement performance criteria that assess the analytical DQIs as specified in the method or laboratory SOP and or subcontract Statement of work (SOW) as applicable.

**Worksheet 30**  
**Analytical Services Table**

<b>Matrix</b>	<b>Analytical Group</b>	<b>Concentration Level</b>	<b>Sample Location/ ID Numbers</b>	<b>Analytical SOP</b>	<b>Validated Data Package Turnaround Time</b> <small>Laboratory/Data Validation</small>	<b>Laboratory/ Organization (Name and Address, Contact person and Telephone Number)</b>	<b>Backup Laboratory/Organization (Name and Address, Contact person and Telephone Number)<sup>1</sup></b>
Sediment	PCB Congeners	Low	TBD	EPA Method 1668A or CBC01.2	65 days (35 days /30 days) <sup>2</sup>	EPA Headquarters Laboratory	CDM Subcontract
Sediment	PCDD/PCDF	Low		EPA Method 1613B + DLM02.0/2.1 – AxyS SOP MLA-017	65 days (35 days /30 days) <sup>2</sup>	AxyS Analytical Services Ltd.	TBD
Sediment	Chlorinated Pesticides	Low		EPA Method 1613B/ AxyS SOP MLA-028	65 days (35 days for laboratory analysis/ 30 days for data validation) <sup>2</sup>	AxyS Analytical Services Ltd.	TBD
Sediment	Percent Moisture	Medium		SM2540G/ AxyS SOP EGN007-07	see above	AxyS Analytical Services Ltd.	TBD
Sediment	PAH	Low		AxyS SOP MLA-021	65 days (35 days /30 days) <sup>2</sup>	AxyS Analytical Services Ltd.	TBD
Sediment	TCL SVOC	Low		SOM01.2 or SW846 Method 8270C	51 days (21 days / 30 days)	DESA	EPA CLP
Sediment	Metals	Low		SW846 Method 6010B/6020	51 days (21 days / 30 days)	DESA	EPA CLP
Sediment	Total Mercury /Methyl mercury	Low		EPA Method 1630/1631	51 days (21 days / 30 days)	CDM Subcontract	TBD
Sediment	TOC	Low		Lloyd Kahn	51 days (21 days / 30 days)	DESA	CDM Subcontract

**Notes:**

- 1: Sediment matrix refers to sediments split sample analyzed for sediment chemical concentration.
- 2: Subcontract laboratories will communicate with the ASC on split sample status and potential analytical difficulties (if any arise). With the approval of the ASC and Task Leader, the turn-around-time for the laboratory data package deliverable can be adjusted to account for re-analysis or additional quality control as necessary.

**QAPP Worksheet #36**  
**Validation (Steps IIa and IIb) Summary Table**

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria <sup>1, 3</sup>	Data Validator (title and organizational affiliation)
IIa /IIb	Sediment	Chlorinated Pesticides –EPA 1613B Modified	Low-trace	Region 2 - National Functional Guidelines*	CDM
IIa /IIb		PCB Congeners – CBC01.2 or EPA 1668A	Low	Region 2 - Data Validation Guidelines SOP HW-46, rev 0 or National Functional Guidelines*	EPA Region 2
IIa /IIb		PCDD/PCDF Congeners – EPA 1613B	Low	EPA SOP HW-19 or 25, Validating PCDD/PCDF by HRGC/HRMS, Revision 1 or National Functional Guidelines*	CDM ASC, Scott Kirchner or designee
IIa /IIb		PAH – Axys Laboratory SOP	Low-trace	National Functional Guidelines*	CDM ASC, Scott Kirchner or designee
IIa /IIb		SVOCs - SOM01.2 Modified or 8270C	Low	Region 2 – Data Validation Guidelines SOP HW-35, rev 1 or National Functional Guidelines*	DESA or ESAT
IIa /IIb		Metals - 6010B/6020 or ILM05.4	Low/Medium	Region 2 - Data Validation Guidelines SOP HW-2, rev 13 or National Functional Guidelines*	DESA or ESAT
IIa /IIb		Methyl mercury - EPA 1630	Trace	National Functional Guidelines modified by QAPP Worksheets #12,15,19 and 24	CDM ASC, Scott Kirchner or designee
IIa /IIb		Total Mercury - EPA 1631	Trace	National Functional Guidelines modified by QAPP Worksheets 12,15,,19 and 24	CDM ASC, Scott Kirchner or designee
IIa /IIb		TOC - Lloyd Kahn	Low	DESA validation SOP or CDM 029A SOP modified by QAPP Worksheets #12,15,,19 and 24	DESA or CDM ASC, Scott Kirchner or designee

**Notes:**

1. Results will be validated if analyzed by a subcontract laboratory by the process of data verification and assessment utilizing the laboratory QC summaries.
2. All validation procedures will utilize the measurement performance criteria in the QAPP and any additional method requirements.

## **QAPP Worksheet #37**

### **Usability Assessment**

An Oversight Summary Report and Data Quality Summary Report will be prepared by CDM personnel. Frank Tsang, Task Order Manager, will be responsible for its content and for assigning this task to CDM personnel. The data comparability review and usability assessment will be conducted on validated data. The effectiveness of control actions will be evaluated during the laboratory review of the data, data validation and data evaluation and data quality assessment process. Data information will be documented in the laboratory narrative, data validation report and in the Data Comparability Report. The report will include an overall assessment of the CPG's analytical data using the results of the split sampling and field oversight including the field oversight observations of deficiencies and compliance; and an assessment of the split sampling data quality. The following items will be assessed for CDM split samples and conclusions drawn based on their results:

**Precision** – Results of laboratory duplicates will be assessed during data validation and data will be qualified according to the data validation procedures cited on Worksheet #36. Split samples will be compared by matrix using the relative percent difference (RPD) for each pair of results reported above quantitation limits (QL) or for organic and inorganic analyses respectively. RPD acceptance criteria of less than or equal those listed in this QAPP will be used to assess sampling precision. Absolute difference will be used when one or both results are at or below the QL. An absolute difference of less than five times the QL will be the acceptance criteria. A discussion summarizing the results of laboratory precision and any limitations on the use of the data will be described in the report.

**Accuracy/Bias Contamination** – Results for all laboratory blanks will be assessed as part of the data validation. During the validation process, the validator will qualify the data following the procedures described on Worksheet #36. A discussion summarizing the results of laboratory accuracy and bias based on contamination will be presented and any limitations on the use of the data will be described in the report.

**Representativeness** – The representativeness of the survey data will be evaluated based on the ability to implement the surface sediment sampling as written in the QAPP. A determination will be made based on the observations completed during the surveys, whether the data results accurately represent the sediment concentrations in the study area during the summer benthic survey, and whether the results are comparable with those made in previous events.

**Comparability** – The results of this oversight will be used in conjunction with the CPG's data to support the investigation results. The data will be handled, analyzed and reported in a manner that is comparable to the CPG's data set. The RPD between CDM's and the CPG's data will be calculated.

**Completeness** – A completeness check will be performed on the split sample data generated by the laboratories. Completeness will be determined based on whether all CPG planned (or modified) sampling locations were sampled at the pre-determined frequencies and the obtained data set compared to the project completeness goal of 90 percent. A discussion summarizing the results of project completeness and any limitations on the use of the data will be described in the report.

For sampling, completeness will be calculated as the number of samples collected and analyzed divided by the number of planned for collection. For each analyte, completeness will also be calculated as the number of data points that meet measurement performance criteria divided by the total number of data points for that analyte. A discussion summarizing the results of project completeness and any limitations on the use of the data will be described in the report.

The results will be presented in text of the Data Comparability Report. Data gaps will be evaluated if requested by USACE/EPA. The report will discuss the completeness of the planned and collected data and the affect on the data objective of evaluating the accuracy of the CPG's data.

**Sensitivity** – Data results will be compared to project action limits provided on Worksheet #15. A discussion summarizing any conclusions about sensitivity of the analyses will be presented, and any limitations on the use of the data will be described in the report.

**Reconciliation** – The PQLGs presented in Worksheet #12 will be examined to determine if the objectives were met. This examination will include a combined overall assessment of the results of each analysis pertinent to an objective. Each analysis will first be evaluated separately in terms of major impacts observed from data validation, data quality indicators and measurement performance criteria assessments. Based on the results of these assessments, the quality of the data will be determined. Based on the quality determined, the usability of the data for each analysis will be determined. Based on the combined usability of the data from all analyses for an objective, it will be determined if the PQLG was met and whether project goals were achieved. As part of the reconciliation of each objective, conclusions will be drawn and any limitations on the usability of any of the data will be described.

The following equations will be used:

1. To calculate split sample precision:  $RPD = 100 * 2 |X1 - X2| / (X1 + X2)$   
where X1 and X2 are the reported concentrations for each duplicate or replicate
2. To calculate split data completeness:  
% Completeness =  $V/n * 100$  - where V= number of measurements judged valid; n = total number of measurements made and  
% Completeness =  $C/x * 100$  - where C= number of samples collected; x = total number of measurements planned

The investigation results will be presented in table and figures and in the text of the Data Comparability Report. Data gaps will be evaluated if requested by USACE/EPA. The report will discuss the completeness of the planned and collected data and the affect on the data objective of evaluating the accuracy of the CPG's data.



References:

Malcolm Pirnie and Battelle Duxbury Operations. 2009. Oversight Quality Assurance Project Plan. Biological Sampling, Community Surveys, and Toxicity and Bioaccumulation Testing. August.

Windward Environmental. 2009. Lower Passaic River Restoration Project. Quality Assurance Project Plan. Final Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing". Revision 0. October 8.

Windward Environmental. 2010. Lower Passaic River Restoration Project. Lower Passaic River Study Area RI/FS. Collection of Surface Sediment Samples Co-located with Small Forage Fish Tissue Samples. Addendum [2] to the QAPP. Surface Sediment and Benthic Invertebrate Toxicity and Bioaccumulation Testing. Draft. May 12.

## Appendix G

Figure 1 Excerpted from CPG's Benthic QAPP  
Addendum No. 2: Collection of Surface Sediment  
Sampling co-located with the Small Forage Fish Tissue  
Samples

during the Summer 2010  
Benthic Invertebrate Community Surveys

